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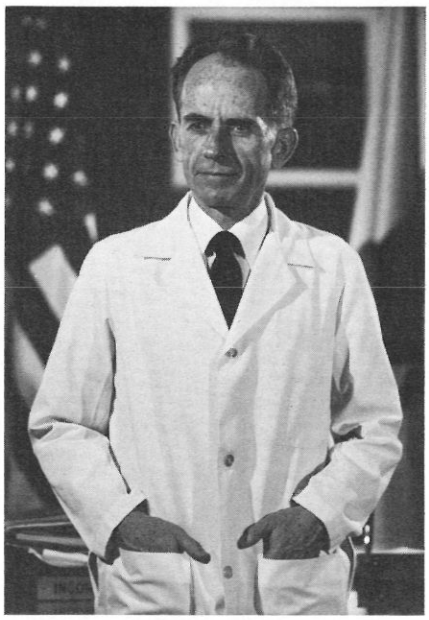
COVER: LCDR A.F. Mataldi (MSC), an environmental health officer with Environmental and Preventive Medicine Unit No. 2, inspects the interior of a dishwasher aboard a Navy ship. The role of environmental health officers in the Navy is one of the topics discussed in an open letter to Medical Service Corps officers, beginning on page 2.

Put Caring Back into Patient Care

IN THE JANUARY 1977 issue of **U.S. Navy Medicine**, I made it clear that I consider our prime responsibility to be the care of our patients, and suggested certain areas where close attention should be paid, lest we inadvertently sabotage our efforts.

With the massive technological complexity of modern medicine and the attendant increases in numbers of personnel required, a disturbing fragmentation and distortion of health care has occurred. Patients become interesting cases or puzzling laboratory problems instead of people needing help. Indeed, our ability to split apart and analyze virtually every product of the human body has led us to the ultimate absurdity—"abnormalities" in search of a disease.

People have illnesses. **People** get sick. We must recognize that and deal with that. People seek help, medical or otherwise, when their anxiety has gone beyond their individual abilities to deal with it. We must assist them in dealing with that anxiety. The attitudes we present are crucial in determining our effectiveness. The outcome may be good; the process may have been psychologically disastrous. The way we measure our effectiveness is not the same as the way our patients measure it.



VADM Arentzen

There are those who abuse our system. But it is unfair and untrue to so categorize the majority of the patients we serve.

Physicians and nurses should, of course, be acutely conscious of patient anxiety, but it is equally the responsibility of every person who interacts with a patient. Staff members who make the initial contact with patients at the admission desk, the clinic desk or the telephone can easily destroy any rapport that may have existed before, can make opponents of our supporters.

A friendly smile, a pleasant voice, an air of concern are worth any number of pharmaceutical nostrums. The simple act of listening is the best tranquilizer in the world. The manner of access to health care is just as important to the patient's perception of his experience as is the care itself. We all know these things instinctively, but in the pressures of daily demands they are sometimes forgotten. That must not happen.

I have asked our medical facility commanding officers to institute training programs for those individuals who work in the initial contact areas to help them understand how very important they and their jobs are. We must institute patient education programs to reduce inappropriate utilization of facilities. A cooperative effort is essential, particularly with our present physician shortfall, if we are to accomplish our mission with the least possible disruption of services.

Unless we care, and show we care, that cooperation cannot be gained. Put caring back into patient care!

W.P. ARENTZEN
Vice Admiral, Medical Corps
United States Navy

Open Letter to the Medical Service Corps

In this, my first letter to officers of the Medical Service Corps, I want to express my appreciation for the outstanding job you have done in the past year. From your associates in the Medical Department, from line officers, and from our patients, I constantly hear words of praise for the services you perform. I am certain that you are true professionals dedicated to the tasks and mission of the Medical Department, and I urge you to continue this fine tradition of service to Navy medicine.

The Corps in '77. I would like to tell you about the areas we are emphasizing this year and what the future holds for us. I will focus on the Medical Service Corps' emerging role in support of the operating forces, contributions to patient care, participation in efforts to improve industrial, occupational and aviation safety, and improvements in management of Navy medical facilities.

Pharmacy. Plans are under way to expand the unit dose drug distribution system. This system allows pharmacists to interpret physicians' original drug orders and dispense to the ward only doses which have been ordered. The system contributes to better patient care by allowing pharmacists to maintain drug profiles which list the patient's diet, diagnosis, drug allergies, and drug sensitivities, as well as other medical information. Using this information, the pharmacist screens physicians' orders for possible drug-drug or food-drug interactions, drug allergies, improper dosage regimens, and drug overlaps. Through this additional check, pharmacists can control and distribute drugs more efficiently, and fewer doses are wasted.

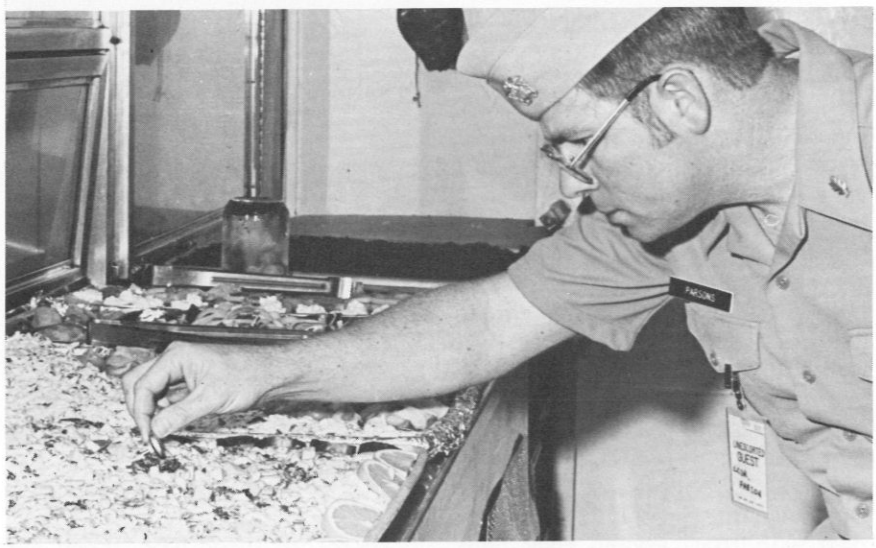
Aviation medicine. Naval aviation physiologists continue to expand their support of the operational forces. Many new initiatives, as well as significant progress in established aviation physiology endeavors, were assessed during a program review conducted at the Bureau of Medicine and Surgery this spring. Particularly noteworthy is the Aviation Medicine Safety Officer (AMSO) Program. The original 12 AMSO billets established to provide direct support to fleet readiness are being expanded to 18; our goal is to have 21 aviation physiologists in the program. This expansion of the program will give aviation physiologists more opportunities to work in areas such as accident prevention, accident investigation, and improvement of survival and rescue techniques. Naval air stations in Beaufort, S.C., and Hawaii, and the Chief of Naval Air Training have priority for these new AMSO billets. We are also considering adding two experimental psychologists to the AMSO Program to investigate and analyze psychological and physiological factors affecting human performance in aviation.

Curricula and resource management for the Naval Aviation Physiology Training Program and Naval Aviation Water Survival Training Program are being revised. Also, several new training devices now in the planning or procurement stages will generate new challenges for students in these programs. Many currently used training devices are being modernized and modified.

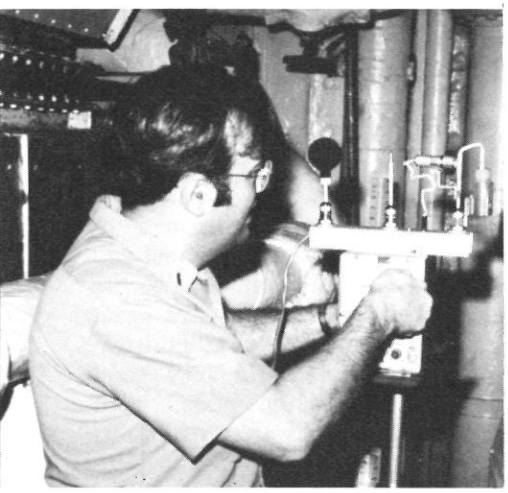
Additional emphasis has been placed on research and development in the Naval Aviation Physiology Program. New career patterns are being developed, with current plans calling for more billets for aviation physiology researchers.

We are looking into the possibility of working with the Air Force to train aviation physiologists as well as aircrew personnel. There are now officer exchange programs at Naval Air Station Barbers Point and Andrews Air Force Base.

Environmental health. During the past year, increasing requirements to support the operating forces have created heavy demands on our



Environmental health officer measures food temperature aboard USS Iwo Jima



Industrial hygienist conducts heat stress survey using wet bulb globe temperature index meter

environmental health officers. Routine environmental health surveys mandated by CINCPACFLT and CINCLANTFLT for all ships have increased the number of ship visits made by Medical Department personnel from our environmental and preventive medicine units and some naval regional medical centers. As a result of these visits, shipboard environmental health problems are being identified and addressed at headquarters level. Through the efforts of environmental health officers, changes are being instituted in ship design and construction to enhance shipboard environmental health.

Environmental health officers at naval regional medical centers have been called on more and more to assist fleet units, particularly ships far from environmental and preventive medicine units. These officers are evaluating the health aspects of new projects—such as a waste water recycling system in Navy housing in Norfolk. Environmental health officers have also helped develop health standards and practices for sewage collection, holding, and transfer systems aboard Navy ships. They have evaluated a new design for shipboard bromination systems and new, more efficient shipboard garbage grinders.

At shore activities, environmental health officers have reviewed plans and provided on-site consultation for food service facilities under construction and renovation. They have reviewed and given advice on the design and construction of sewage hose cleaning and storage facilities at fleet activities. Occupational health demands are being met by environmental health officers at several activities that do not have industrial hygienists.

Environmental health officers often participate in IG inspections of Marine Corps and Naval Supply Systems Command activities. The Naval Board of Inspection and Survey requests environmental health officers to participate in health inspections conducted aboard aircraft carriers. Indeed, this expertise is in such demand that an environmental health officer will be assigned to one of the subboards of the Naval Board of Inspection and Survey.

Because of Joint Commission on Accreditation of Hospitals (JCAH) emphasis on environmental safety in hospitals, environmental health officers are playing a bigger role on hospital infection control committees and in investigating the many facets of hospital environmental health.

Industrial hygiene. Industrial hygienists continue to take a major role in operational medical support. Stationed at rapid response units such as the Navy Environmental Health Center and environmental and preventive medicine units, industrial hygienists respond to requests for surveys on ships, among their other functions. By conducting these surveys, industrial hygienists help commands recognize, evaluate and control occupational hazards arising from chemical or physical stress. Industrial hygienists conduct heat stress and noise surveys to fulfill Navy inspection requirements, and help commands interpret and apply regulations set by the Occupational Safety and Health Administration.

Future plans for our industrial hygienists include stationing them at major naval regional medical centers to augment occupational medicine services—a development that will nearly double the number of Navy industrial hygienists.

Clinical psychologists. Clinical psychology gained wider professional recognition during World War II because of its contributions to the psychodiagnostic testing of military personnel. Military clinical psychologists, well trained in research skills, have contributed to the foundations of scientific knowledge by developing techniques to screen people for Antarctic duty and to judge performance of people serving in isolated areas. More recently, Navy clinical psychologists have investigated psychiatric disorders among Navy and Marine Corps personnel, as well as the causes and consequences of alcoholism.

In the Navy, clinical psychologists have assumed a larger role in direct patient care. Through neuropsychological assessment of brain dysfunction, for example, clinical psychologists broaden the use of psychological tests and measures as aids to differential diagnosis. Clinical psychologists have also made contributions to the development of innovative intervention and treatment techniques. They routinely evaluate outpatients, and conduct individual and group psychotherapy for inpatients and outpatients in psychiatric, alcohol rehabilitation, and drug rehabilitation facilities.

A recent development is the conversion of several Medical Corps psychiatry billets to Medical Service Corps clinical psychology billets. This greater leadership responsibility for clinical psychologists is consistent with trends of the past decade in Navy medicine and civilian mental health practice: the multidisciplinary team is becoming predominant, with an emphasis on working directly with community mental health agencies. Clinical psychologists, trained in the community mental health approach, have been leaders in implementing "outreach" approaches to prevent

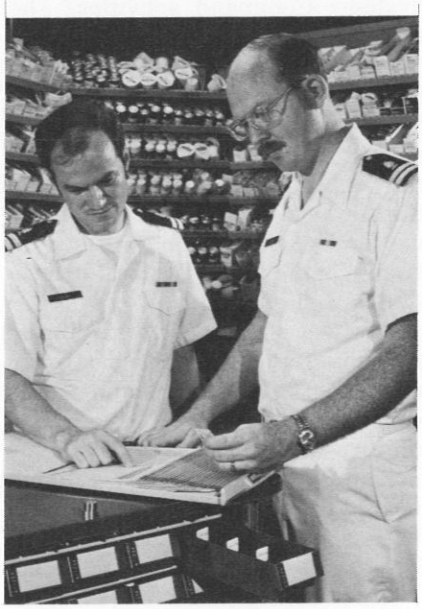
or alleviate mental disorders. In our regional medical centers and hospitals, clinical psychologists increasingly refer patients to almost every medical service.

Direct consultation to operational and training commands is an important example of the role increasingly filled by the clinical psychologist. For several years, Navy clinical psychology has provided the only mental health and training consultation to the Navy's Survival, Evasion, Resistance, and Escape bases in Maine and California. Another five MSC clinical psychologists now work full-time at the Naval Academy as course coordinators, instructors, consultants to aptitude and academic boards, and researchers, as well as clinicians. These officers also provide a psychology emergency watch for Naval Hospital Annapolis. The Alcohol Rehabilitation Center at San Diego, the three naval training centers, and the two Marine Corps recruit depots are other examples of line commands with full-time MSC clinical psychologists.

The new alcohol rehabilitation service at Portsmouth, Va., will have a full-time MSC clinical psychologist. A new MSC clinical psychology billet at Naval Hospital Patuxent River, Md., will provide a much needed full-time consultant for the expanding naval air station and flight test center. The Marine Corps Air Station at Cherry Point, N.C., also has a new full-time billet for an MSC clinical psychologist. A new billet has been created for an MSC clinical psychologist who will provide full-time consultation to the fleet in Mayport, Fla.

These trends toward direct patient service and consultation to the fleet are expected to continue. The number of Navy clinical psychology billets increased 38% in FY77. Some 55% of our currently commissioned clinical psychologists were augmented from the Reserve, and approximately 60% have prior military service.

Health systems management. Although the average length of inpatient stay (ALOS) for active-duty members is only one indicator of noneffective time, this statistic is widely used by regulators to assess the efficiency of the Navy health care system. We have made great progress in reducing the average length of inpatient hospitalization in our facilities: in FY75 the ALOS for active-duty Navy and Marine Corps inpatients in Navy medical facilities was 19.7 days; that average went down to 12.5 days in FY76 and 7.9 days in March 1977. Partly as a result of more efficient inpatient administration programs, the ALOS for active-duty inpatients has decreased approximately 60%. In March 1977 the ALOS for all patients in naval medical facilities was 6.5 days, compared to 7.4 days for patients in short-term, acute care civilian hospitals.



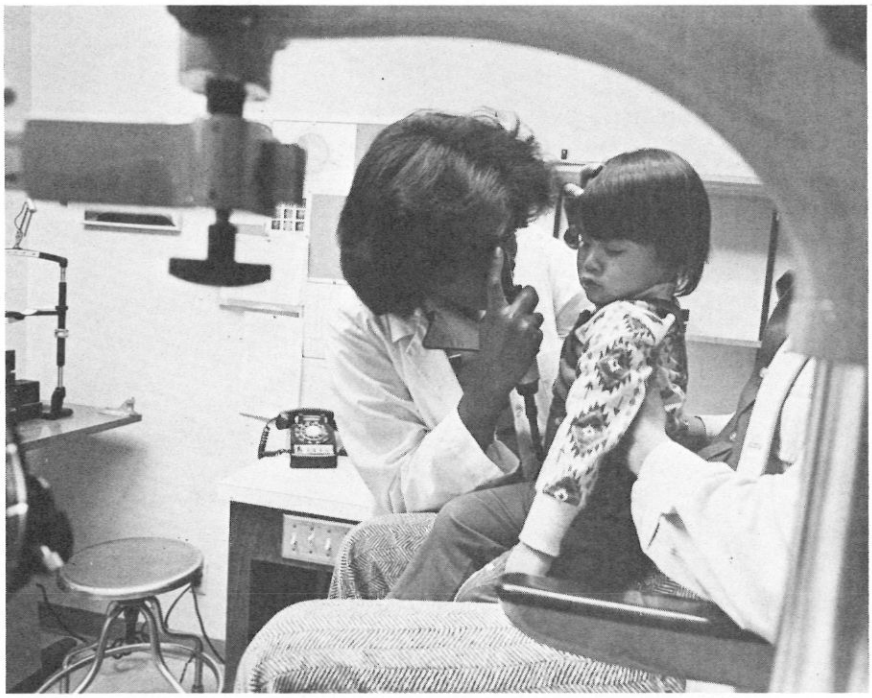
LT Pat Cronin (left) and LT Terry Irgens screen drug orders at NNMC

In providing quality health care services to our active-duty members, we will continue to emphasize reducing the time these men and women are noneffective. Further improvement in ALOS may be obtained if we stay aware of alternatives to continued inpatient care, improve the timeliness and effectiveness of administrative processing, and apply utilization review procedures. Medical Service Corps officers are contributing in all these areas by conducting innovative and progressive systems analyses and by providing good management support.

Word processing systems. Word processing systems—the use of specialized, full-time personnel and automated equipment to process paper work efficiently—have great potential to improve our administrative support services. In Navy medical centers and hospitals, word processing systems are enabling us to centralize dictation and transcription of medical and administrative reports. Some facilities use shared-logic mini-computers in their word processing systems: Naval Regional Medical Center San Diego, for example, set up a COMPUTEXT minicomputer system in November 1975 with excellent results, and similar systems are being installed at the National Naval Medical Center and Naval Regional Medical Center Portsmouth.

The Medical Service Corps officer's role in evaluating word processing innovations is to provide the systems analysis and management expertise we need to plan, develop, implement and maintain these vital administrative support systems. Word processing gives us an opportunity to use our personnel more efficiently, to edit and process more documents in a given time, and to improve the quality and timeliness of medical records. Word processing will allow us to process documents better and faster, and to increase the cost effectiveness of administrative support functions.

Contact point management. To promote cooperation and understanding between providers and consumers of our medical services, naval medical facilities have set up health care consumers' councils and patient education programs. In conjunction with those efforts, we can improve service at patient contact points. Medical Service Corps officers should lead in setting up programs to train people who work in areas where they have direct



LTJG Doris Forte uses ophthalmoscope to examine young patient

contact with patients. Responsive, individualized help, given courteously and compassionately, can benefit not only the patient but also the treatment facility.

Personnel. Directing our attention to support of the operating forces has raised several questions this year. For example, there is a shortage of MSC volunteers for duty with the Fleet Marine Force. Duty with the Fleet Marine Force gives MSC officers an excellent opportunity to assume great responsibility early in their careers, and to obtain outstanding training and valuable experience. Tours with the Fleet Marine Force lead to progressively higher levels of responsibility not otherwise available to MSC officers. Officers who wish to serve with the Fleet Marine Force should inform the MSC detailer at BUMED, either by submitting a new preference card or by telephone. We will make every effort to honor such requests.

Augmentation. Augmentation is the procedure by which a Reserve MSC officer (designator 2305) or temporary MSC officer (2302) can extend his or her contractual status to indefinite as a Regular naval officer (2300). The advantages of augmenting in the Medical Service Corps are many, and include:

- Guaranteed 20 years' commissioned service after the augmented officer attains LCDR rank.
- Opportunities for full-time outservice training.
- Overseas assignments which require a service obligation beyond the contractual limits assigned a Reserve officer.
- Career security not available to Temporary and Reserve officers.

Because we do not now have a quota for Regular MSC officers, Temporary and Reserve officers do not compete against each other for a limited number of augmentation opportunities. Each officer who applies for augmentation is evaluated by a selection board which meets twice a year. The officer's record along with the command endorsement are the major items evaluated for selection. Information about augmentation can be found in the BUPERS Manual, Article 1020120.

Training. It appears that the Medical Service Corps will be able to continue its support of all training programs, including inservice, outservice and part-time training. The number of training billets projected has not changed, and we expect that about 100 MSC officers can be retained in full-time education programs at any one time.

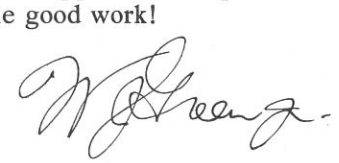
In a move to make health care administration training more cost effective, we have ordered three officers to the Army/Baylor University Program at Fort Sam Houston, Tex., leading to a master's degree in health administration. This program, along with Navy Postgraduate School programs in financial management, personnel management and computer systems management, will provide the bulk of our health care administration training.

Training billets will continue to be allocated for the various specialties. All full-time training must be justified by a requirement for someone with that training and lack of a qualified officer to fill the billet. Officers interested in applying for full-time training should review the BUMED Instruction 1520.12 series.

■

The year 1977 and 1978 offer many challenges and opportunities for the Medical Service Corps. I urge each of you to meet these challenges by making your own unique contributions to better patient care. The Medical Service Corps is a group with great expectations and unlimited promise, and the military community you serve will rely more and more on you in the future. I ask you to resolve not to disappoint the people who look to you for help, and thereby not disappoint yourselves. I have the greatest confidence in your loyalty and ability.

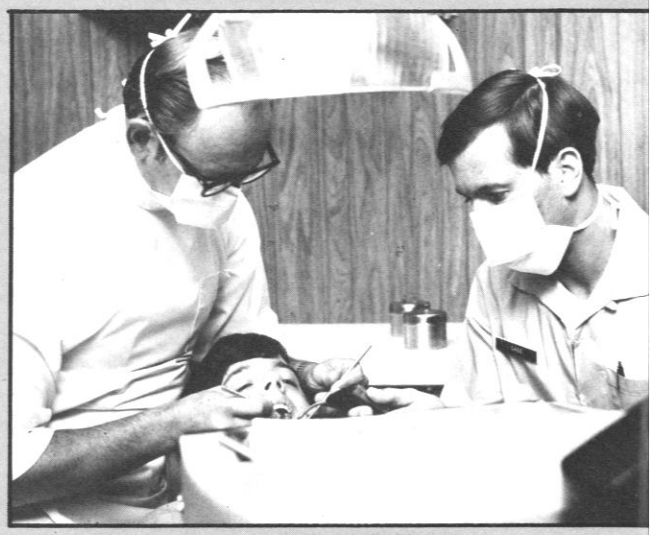
I thank you for your fine effort and support in the past. Keep up the good work!



W.J. Green, Jr.
Captain, Medical Service Corps
United States Navy

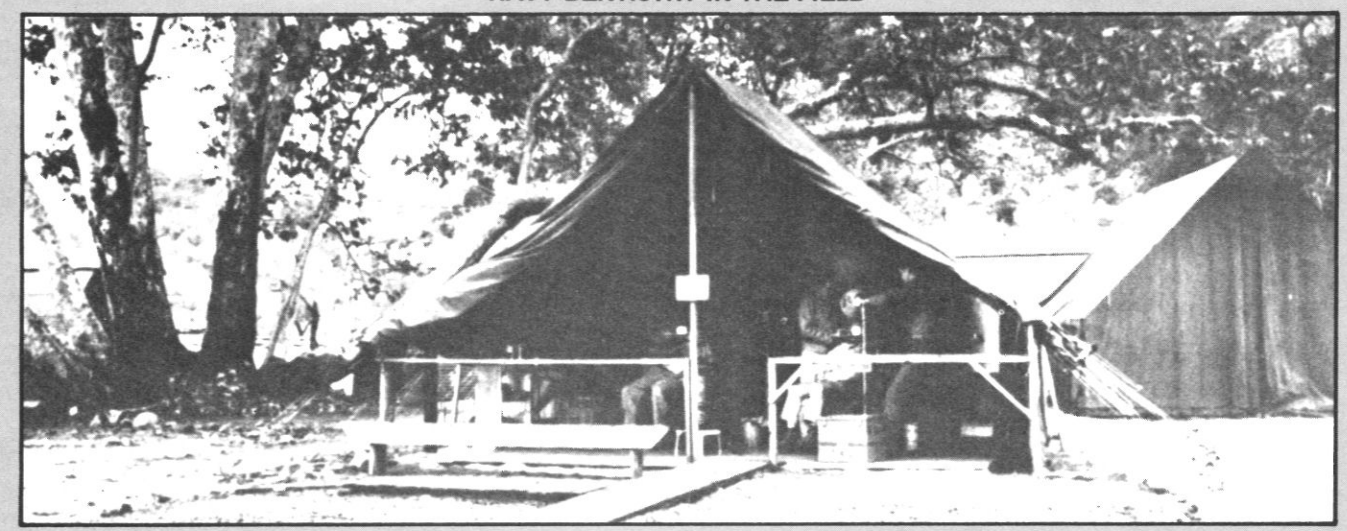
DENTAL HEALTH CARE DELIVERY

Navy dental care in 1931



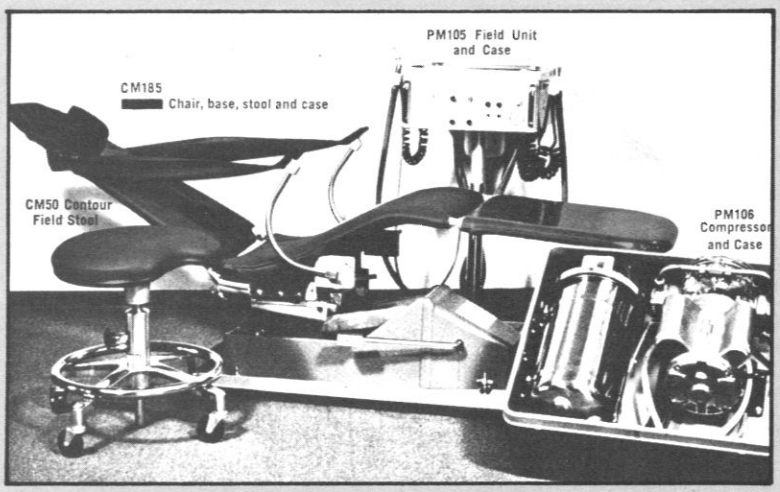
Comprehensive dentistry in today's Navy

NAVY DENTISTRY IN THE FIELD



Typical field dental clinic during World War II

Mobile unit provides dental care aboard ship



This portable equipment used today to provide dental care in the field

Dental Corps

65 Years of Change

The Navy Dental Corps marks its 65th anniversary this month. The past 65 years have brought many changes in dental care provided to the active naval forces—changes motivated by the need to keep pace with advances in dental technology and materials.

Growth. The need for military dentistry was recognized as early as 1844 by Edward Maynard, M.D., D.D.S., a well-known practitioner of dentistry in Washington, D.C. But not until 22 Aug 1912 did Congress pass an Act establishing the Navy Dental Corps and authorizing the Secretary of the Navy to appoint 30 acting assistant dental surgeons. From those first 30 dental officers, the Dental Corps has grown to today's force of approximately 1,700 active-duty officers. These men—and now six women—are supported by nearly 3,000 dental technicians, some 65 Medical Service Corps officers, and more than 380 Navy civilian employees.

When the 1912 legislation was enacted, Congress appropriated only $15,000 for dental outfits, dental materials, and other necessary expenses. By today's standards that funding was modest. Since then, the changes have been impressive—our active naval forces now enjoy modern, comprehensive dental care ashore and afloat.

Regionalization. The latest innovation in Navy dental care is the dental regionalization program. Through effective command management as well as technical control over dental procedures, regionalization has improved dental care delivery and led to a notable increase in the treatment accomplished by each dental officer. This increase in productivity has resulted in marked improvement in the dental health of Navy members (see chart). For example, the percent of Navy members who needed no dental treatment increased from 39.4% in 1975 to 48.6% in March 1977.

The Dental Corps continues to improve dental care for the active naval forces through effective resource allocation, dental research, and education. Inservice training programs for dental officers—residencies, postdoctoral fellowships, and continuing education courses—are structured to meet the Navy's requirements for dental officers with specific skills. These training programs ensure up-to-date care for Navy members by keeping dental officers in the field abreast of new developments in dentistry.

Top priority has been given to developing a quality review mechanism for procedures most commonly performed in Navy dentistry. Guidelines developed to objectively evaluate the quality of clinical treatment are now being tested in pilot projects.

To improve management, the Dental Corps is testing a dental information retrieval system. When fully operational, this automated data processing system will provide Corps managers with a wide array of data to use in assessing the dental treatment needs of active-duty members and the professional accomplishments of dental officers. The information will be invaluable in deciding how to allocate resources.

Annual exams. The primary mission of the Dental Corps is to provide dental care for active-duty Navy and Marine Corps personnel so as to ensure their combat readiness. Many Navy members seek treatment on their own initiative—but some do not, and there is a need to identify and treat dental disease in these people. To identify these members, and to better assess dental treatment requirements of all active-duty personnel, an annual dental examination is now required for active-duty members. Dental facilities must maintain close contact with all levels of command to coordinate these examinations. Annual examinations will allow earlier detection, diagnosis and treatment of dental disease; thus the Dental Corps will have a clearer idea of future workloads and will be able to plan more efficient use of dental personnel. Line commanders will be able to manage their personnel

Dental Health Profiles, 1975 and 1977

Classification	Percent of active-duty Navy members in each class	
	September 1975	March 1977
Class I—people requiring no dental treatment	39.4%	48.6%
Class II—people who need routine but not early treatment	40.5%	39.8%
Class III—people requiring early treatment	17.3%	9.8%
Class IV—people who require essential prosthetic appliances	2.0%	1.8%
Class V—people requiring emergency treatment	.02%	0

more effectively when these commanders know which members require treatment.

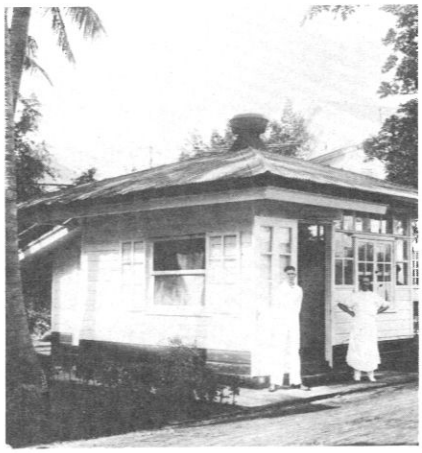
A standardized system for examining patients and classifying them into treatment categories has been developed. By providing explicit classification criteria, this revised system enables dental officers to better determine:

- urgency or priority for treating an individual.
- patient's treatment needs and suitability for transfer to areas where dental support is minimal.
- operational readiness of a command or unit.

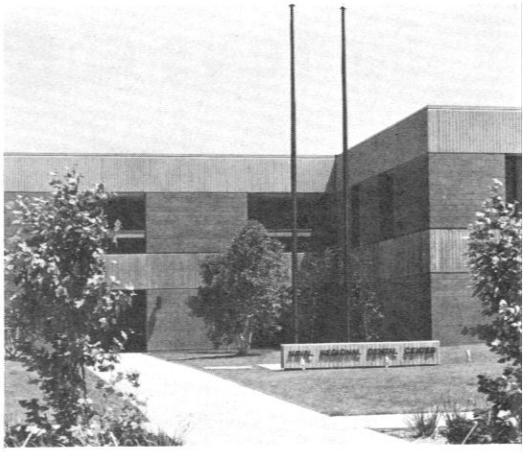
Also, SECNAV and BUMED directives have been issued which emphasize the priority of dental treatment for members of the Navy and Marine Corps operating forces.

Quality care. The Dental Corps is doing everything possible to ensure quality care for the most essential element of our weapons system: the men and women of the Navy and Marine Corps. The impressive contribution made by Navy dental officers in support of the Navy's mission during the past 65 years provides a firm base for meeting the challenges of the future.

DENTAL SHORE FACILITIES

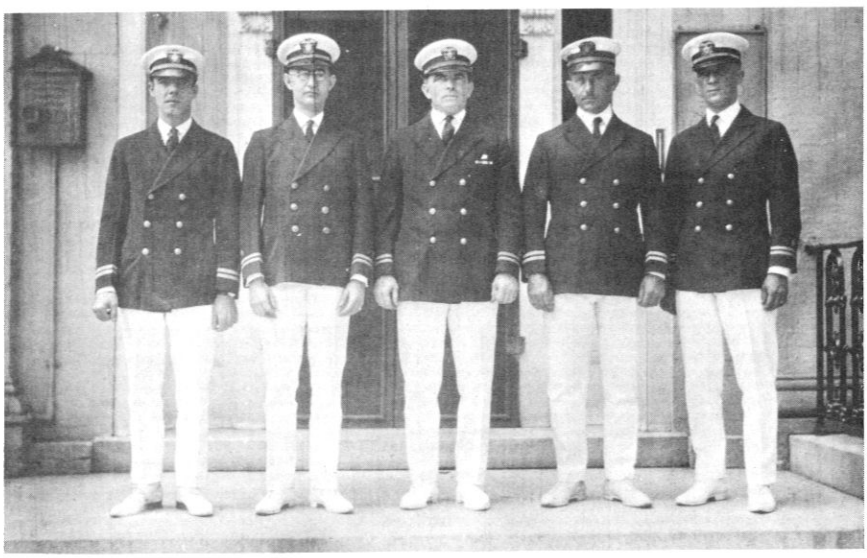


Dental office in Philippine Islands, 1932



NRDC San Diego, Calif., 1977

GRADUATE TRAINING



First graduating class, U.S. Navy Dental School, 1923 (right); (bottom) 1977 graduates from National Naval Dental Center, Bethesda, Md.

Aerospace Medicine Honors Its Own

Three Navy flight surgeons were honored at the Aerospace Medical Association's 48th annual scientific meeting, held 9-12 May in Las Vegas.

Receiving the third annual Richard E. Luehrs Memorial Award and the title "Navy Operational Flight Surgeon of the Year" was LT Willis E. Martin (MC), a Reservist on active duty as flight surgeon for Marine Air Group 26 in New River, N.C. LT Martin was cited for outstanding performance of duty, including support of special missions in the Mediterranean.

"The spartan conditions proferred to flight surgeons in the Second Marine Aircraft Wing have not deterred LT Martin's determination, ability or professionalism," his wing medical officer noted when nominating LT Martin for the award.

A native of Roanoke Rapids, N.C., Dr. Martin received his M.D. degree from the University of North Carolina at Chapel Hill and entered active duty in July 1975.

CAPT Joseph A. Pursch (MC) received the Raymond F. Longacre Award, given annually to recognize outstanding accomplishment in aerospace psychology and psychiatry. A well-known expert on drug and alcohol abuse, Dr. Pursch directs the Naval Alcohol Rehabilitation Service in Long Beach, Calif., where he has pioneered in training physicians to recognize and treat alcoholism. In 1976 he was named the Surgeon General's special assistant for alcoholism.

After graduating from the Indiana University School of Medicine in 1959, Dr. Pursch became a Navy flight surgeon. Later board certified in neuropsychiatry, he served as personal physician to the Secretary of the Navy, as well as assistant chief of the Division of Psychiatry, Naval Aerospace and Regional Medical Center Pensacola, and head of the Neuropsychiatry Department, Naval Hospital Naples, Italy.

Retired Medical Corps CAPT Channing L. Ewing received the Eric Liljencrantz Award, given for basic research into the problems of acceleration and altitude. As chief scientist at the Naval Aerospace

Channing L. Ewing, M.D.

Medical Research Laboratory Detachment, Michoud, La., Dr. Ewing studies human dynamic response to crash impact acceleration; his research will provide the first valid data on limits of human tolerance to crash impact. He is also conducting basic research into the effects of severe ship motion on human subjects.

Since 1959, Dr. Ewing has been studying ways to protect humans from the impact of crashes and ejections. From 1959 to 1968, he conducted all the Navy's in-house research and development on crash helmets. His development of physiologically-based crash helmet tests for the Army and Navy led him to study inertial responses of human body segments to impact acceleration, physiological responses to these inertial responses, and more recently, the pathological basis of the physiological responses. When he retired from the Navy Medical Corps last year, Dr. Ewing was officer-in-charge of the Detachment where he now conducts his research.

A graduate of the Medical College of Virginia, Dr. Ewing holds a master's degree in public health and completed residency training in aviation medicine.

CAPT Joseph Pursch (MC)

LT Martin (center) with Mrs. Luehrs and RADM R.E. Nauman (MC)

BUMED SITREP

WEIGHT STANDARDS . . . Change 91 to the *Manual of the Medical Department* gives revised weight standards for Navy and Marine Corps men and women. However, these new standards apply only to individuals being recruited —not to personnel already on active duty. Once on active duty, Navy and Marine Corps members must meet the weight standards set forth in BUPERS Instruction 6110.2B.

CORPSMEN NEEDED . . . Two chief hospital corpsmen will be needed in an independent duty status for Operation Deep Freeze '79 to provide medical care for civilian scientists working at remote stations in Antarctica. The only contact with a medical officer will be by radio.

If you are interested in this unique assignment, review BUPERS Notice 1300 of June 1977 for eligibility requirements. Applicants will be chosen in late 1977, screened in early 1978, and the men selected will deploy to Antarctica around October of that year.

HEAT STRESS . . . To combat heat stress, salt tablets should be used with great caution—and only under medical supervision. BUMED Instruction 6200.7A of 26 Jan 1977 advises that people in hot, humid climates should not take more than 2 gm of supplementary salt (three tablets) a day. This restriction is particularly important for older individuals, who retain more salt. The revised instruction describes types of heat casualties, such as rash, cramps, exhaustion, and stroke, as well as preventive measures.

A new source of heat stress information aimed at a general Navy audience is the Navy training film, "The Heat Stress Monster." The 27-minute color cartoon illustrates right and wrong ways to deal with heat and humidity. Videotape cassettes can be ordered now from the Audiovisual Resources Division, Naval Health Sciences Education and Training Command, National Naval Medical Center, Bethesda, Md. 20014. Prints of the 16 mm film will be available in October.

Production has begun on a more detailed movie covering the same subject. "If You Can't Stand the Heat," a Navy training film aimed at supervisors, should be ready for viewing next spring.

LOCK AND KEY . . . Naval medical facilities must establish physical security review committees to assist commanding officers in safeguarding hospital property, in line with OPNAV Instruction 5510.45B.

Key rings must be kept in a secure locker after normal working hours. Anyone who checks keys in or out must sign a control log. Master keys should be kept only by top managers. Commanding officers must authorize, in writing, individuals who may hold keys; a copy of the authorization will be placed in the member's file jacket.

TOO MUCH GOLD? . . . According to the Navy Audit Service, dental activities should maintain only enough gold and other precious metals to meet command requirements. Excess metals must not be sold or exchanged, but should be disposed of in line with provisions of the *Defense Disposal Manual*, Chapter V. Command audit boards should weigh and examine bundles of obsolete and unused precious metals during inspections, to ensure that the precious metals inventory is complete and accurate.

NOTE OF CAUTION . . . On arriving in foreign ports, shipboard medical department representatives should establish close liaison with local medical authorities to reduce problems in the event of a crewmember's death or injury. Medical department representatives should ask about availability and phone numbers of local hospitals, pathologists, and ambulance services, as well as the method of paying for these services and local requirements for reporting deaths.

ERRATUM

Our readers have alerted us to several errors that appeared in "How Medical Department Officers are Assigned" (*US Navy Medicine*, April 1977):

- Reference to normal tour lengths for Medical Department officers in general should be deleted in view of different requirements and types of tours for each corps. Tour lengths are determined and projected rotation dates (PRDs) assigned in accordance with BUPERS policy for the type of duty and area involved. An officer's PRD is reflected on the Officer Distribution Control Report (NAVPERS 1301/5) available at each command.
- When reassignment is requested either because of documented hardship or to be with one's spouse, and when no valid PRD exists, permissive orders involving no cost to the government may be issued, providing a valid billet is available.
- Only Medical Corps officers should send requests for extension of active duty to the Chief of Naval Personnel via BUMED Code 312. Dental Corps officers should send such requests via BUMED Code 613, Medical Service Corps officers via BUMED Code 711, and Nurse Corps officers via BUMED Code 321.
- The correct reference for information on early release from active duty of Reserve officers is BUPERS Manual, Article 3830100. Information concerning resignation policy for both Regular and Reserve officers is contained in the SECNAV Instruction 1920.3 series.
- ALNAV 082/76 discontinued *all* early release of officers and enlisted personnel for the purpose of attending school—including, but not limited to, graduate medical or dental education.
- The first paragraph of page 18 of the April issue should read (revised material in italics): All Medical Department officers should give assignment officers current, pertinent information that might affect their assignability. *Commands should ensure that copies of officers' reporting and detachment endorsements, acceptances of augmentation, and promotion appointments are forwarded to the appropriate BUMED codes.* Information which should be provided in the "Remarks" section of an updated preference card includes: number and age of children; spouse's name, civilian occupation or (if military) rank/rate year group, social security number, designator, rotation date, duty station, and name and telephone number of detailer; spouse's school completion date (if a student); spouse's *estimated date of confinement or delivery*, if pregnant.

Notes & Announcements

DENTAL CONTINUING EDUCATION COURSES

The following dental continuing education courses will be offered in November 1977:

National Naval Dental Center, Bethesda, Md.
Preventive dentistry 14-16 Nov 1977

Eleventh Naval District, San Diego, Calif.
Operative dentistry 7-9 Nov 1977

U.S. Army Institute of Dental Research, Walter Reed Army Medical Center, Washington, D.C.
Prosthodontics 7-10 Nov 1977

Requests for courses administered by the Commandant, Eleventh Naval District, should be submitted to: Commandant, Eleventh Naval District (Code 37), San Diego, Calif. 92132. Applications for other dental continuing education courses should be submitted to: Commanding Officer, Naval Health Sciences Education and Training Command (Code 5), National Naval Medical Center, Bethesda, Md. 20014. Applications should arrive six weeks before the course begins.

Cross-country travel and travel from outside the continental U.S. to attend dental continuing education courses generally will not be approved due to funding limitations.

NAVY OCCUPATIONAL HEALTH WORKSHOP

The 20th Navy Occupational Health Workshop will be held 7-11 Nov 1977 at the Seattle Hilton Hotel, Seattle, Wash. The workshop is directed to physicians, nurses, industrial hygienists, medical safety officers and program managers, and should be of special interest to people in federal occupational health programs.

There is no registration fee. For further information, write to the Navy Environmental Health Center, 3333 Vine Street, Cincinnati, Ohio 45220. Or phone (Area code 513) 684-3863 or Autovon 989-3863.

CONTINUING EDUCATION FOR NAVY NURSES

In the latter part of 1977, the Naval Health Sciences Education and Training Command will sponsor the following continuing education courses for Navy nurses:

Management: Human Relations Performance Evaluation (24 contact hours)
25-28 Sept 1977 Bethesda, Md.
3-6 Oct 1977 Camp Pendleton, Calif.

This workshop will help supervisors understand why people behave the way they do and how to manage feelings, attitudes, and reactions of others. Principles of performance evaluation will be presented, as well as counseling skills, performance expectations, and analysis of performance problems.

Problem Oriented Records and Nursing Audit (18 contact hours)
19-21 Sept 1977 Bremerton, Wash.

Participants will learn the components of the problem-oriented system and the basic principles of problem-oriented medical records and audit. Practice will be given in developing problem lists, writing progress notes in the 'SOAP' format, and applying principles of audit using the problem-oriented system.

Diabetes in Perspective (18 contact hours)
14-16 Nov 1977 Memphis, Tenn.

The conference is designed for nurses who want to update their knowledge on diabetes. Nurses will also develop teaching plans to prepare diabetic patients to take a greater part in their own health care.

The courses are open to Nurse Corps officers not currently assigned to an oversea billet. However, nurses assigned to Argentia, Newfoundland; Bermuda; Guantanamo Bay, Cuba; Keflavik, Iceland; and Roosevelt Roads, Puerto Rico, who have served at least six months on active duty may apply. The courses are also open to Nurse Corps officers of the inactive Reserve on a space-available basis.

Nurse Corps officers wishing to attend these courses should apply to the Naval Health Sciences Education and Training Command (Code 7), National Naval Medical Center, Bethesda, Md. 20014, following procedures set forth in the BUMED Instruction 1520.8 series. Applications should be submitted several weeks before a course begins.

PUBLIC HEALTH SERVICE OFFERS MEDICAL SEMINARS

The U.S. Public Health Service Hospital at Carville, La., will offer the following medical seminars during 1977-1978:

Hansen's Disease	4-5 Oct 1977
	7-8 Mar 1978
	9-10 May 1978
Management of Insensitive Feet	18-20 Oct 1977
	14-16 Feb 1978

For details and registration information, write: Chief, Training Branch, U.S. Public Health Service Hospital, Carville, La. 70721. Or phone (Area code 504) 642-7771.

Policy

Safety Tips

Preventing Respiratory Therapy Hazards

CDR John P. Swope, MC, USN
BUMED Code 416

Respiratory therapy is an allied health specialty used under medical direction to treat, manage, control and evaluate patients with deficiencies and abnormalities of the cardiopulmonary system. Respiratory therapy includes the use of medical gases and apparatus to administer these gases, environmental control systems, humidification, aerosols, medications, ventilatory support, bronchial pulmonary drainage, pulmonary rehabilitation, cardiopulmonary resuscitation, and airway management.

The National Fire Protection Association Standard for Respiratory Therapy (NFPA 56B), which governs the use of respiratory therapy equipment and medications, was revised in 1976. The revised standard applies to all facilities where respiratory therapy and resuscitation procedures are administered, and covers the use of nonflammable medical gases, vapors, and aerosols as well as the equipment used to administer these substances at normal atmospheric pressure. The standard does not apply to areas using special atmospheres, such as hyperbaric chambers.

NFPA 56B offers guidance for protecting patients and hospital personnel against hazards associated with respiratory therapy: fire, chemical reactions, electricity, and mechanical hazards associated with gas storage devices.

Fire hazards: For fire to occur, combustible or flammable materials, oxygen or other oxidizing agents, and a source of ignition must be present. Combustible materials not normally considered hazardous may become hazardous as the amount of oxygen in the atmosphere increases. Examples of combustible materials often found near patients include hair oils, oil-based lubricants, skin lotions, facial tissue, oxygen, bed linen, tent canopies, rubber and plastic articles, gas supply and suction tubing, and chemicals.

A particular hazard exists when high-pressure oxygen equipment becomes contaminated with grease, oil, or other combustibles. Such contaminants ignite readily and burn rapidly in high concentrations of oxygen; under these conditions, even less combustible materials are quicker to ignite.

Sources of ignition include open flames, sparking toys, radiant heaters, or cigarettes being smoked in oxygen tents. The discharge of a cardiac defibrillator may also be an ignition source. (The literature contains several reports of patients being severely burned when the discharge of a cardiac defibrillator ignited the combustible vapor formed when alcohol fumes mixed with oxygen used in the patient's therapy.) Electrical equipment such as razors, bed controls, hair dryers, remote TV controls, and telephones may be a source of ignition in an oxygen-rich atmosphere.

Chemical hazards: Residual sterilizing agents in high-pressure equipment may create chemical hazards. Also, some breathing mixtures, when they contact hot surfaces, may decompose and produce toxic or flammable substances.

Mechanical hazards: Primary mechanical hazards are associated with improper handling of heavy, bulky compressed gas cylinders. For example, storing cylinders outdoors or in unheated ventilated rooms may create hazards: when the tanks are chilled, the pressure inside drops; then when the cylinder is reheated, the pressure may exceed the cylinder's limits and the cylinder may rupture. To ensure safety, cylinders should be maintained at a constant temperature.

Also, cylinders should be stored so securely that they cannot tip over. Safety features such as valves and connections should not be altered or bypassed.

NFPA 56B specifically prohibits mixing gases or transfilling one gas cylinder with the contents from another cylinder. This prohibition guards against incidents such as the one that occurred when oxygen was transfilled into a cyclopropane tank by mistake during a surgical operation; this extremely explosive mixture detonated, killing four people and injuring several others.

Electrical hazards: In addition to the hazards, mentioned above, of electricity in the ignition of fires, electrical shock hazards may be associated with defective equipment. When nebulized liquids are used in patient care, there is a conductive pathway between the patient and the electrical equipment which may cause the patient to be included in an electrical circuit, with consequent electrical shock.

One section of NFPA 56B, entitled "Equipment," lists various requirements users of gases must meet; for the most part, these requirements are based on other cited standards. For example, in the "Gas

Supply'' subsection, users are directed to conform with the 1974 NFPA Standard for Nonflammable Medical Gas Systems (NFPA 56F).

Construction and testing of gas cylinders fall under the jurisdiction of the U.S. Transportation, Specifications and Regulations.

Commercial Standard 223-59, ''Casters, Wheels, and Glides for Hospital Equipment,'' directs that oxygen tents which rest on the floor, and other such apparatus used in administration of oxygen, must be so designed that the entire apparatus is stable during storage, transportation, and use. Copies of Commercial Standard 223-59 are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Oxygen tent canopies that have flexible components must be made of materials with a maximum burning rate classification of ''slow burning.'' Burning rate classifications are set forth in Underwriters Laboratory Subject 94, ''Burning Tests of Plastic.''

Equipment designed for use with high-pressure gas cylinders must either be capable of service at full cylinder pressure, or must be equipped with or constructed for use with a pressure-reducing regulator.

NFPA 56B specifies that liquid containers and reservoir jars—such as jars used to hold medicines—shall be made of transparent material that does not react with the solutions contained in the jars.

Humidifiers and nebulizers must be equipped with an overpressure relief valve or an alarm that will sound when the flow of gas is obstructed.

Gas supply connections—including the pin-index safety system for medical gases—are covered by the American National Standards Institute (ANSI) Standard for Compressed Gas, Compressed Gas Cylinders, Valve Outlets and Inlet Connections (B57.1). When low-pressure connections of the threaded screw system are used, the connections must comply with standards set forth in the Compressed Gas Association's pamphlet V-5, ''Diameter Index Safety System.'' Low-pressure coupler connections shall be noninterchangeable for different gases. Regulators and gauges used for high-pressure service shall be listed by Underwriters Laboratory or Factory Mutual as acceptable for such service; pressure-reducing regulators shall be appropriate to the pressure applied to the system.

Electrical equipment used in respiratory therapy shall comply with the appropriate articles of NFPA 70 (issued in 1975), which is the National Electrical Code. Electrical equipment used in an oxygen-rich atmosphere shall be listed for such use by Underwriters Laboratory or Factory Mutual; unlisted equipment shall not be used in an oxygen-rich atmosphere.

EQUIPMENT, APPARATUS, WIRING

Equipment, apparatus, and wiring used in anesthetizing locations during respiratory therapy shall comply with the 1973 Standard for the Use of Inhalation Anesthetics (NFPA 56A). The ''Equipment'' section of this standard directs that cylinder carts shall be self-supporting, with enough chains or stays to firmly retain the cylinders. One of the hazards of handling cylinders is that the cylinder necks can be ruptured, with a resulting powerful efflux of compressed gas. The jet action effect of this efflux is so strong that in one incident the cylinder was propelled through two cement walls, struck the rear of an automobile, passed through the automobile's body, and pushed the engine out the front. Another hazard is that rupture can cause the cylinder to spin wildly, endangering nearby people and equipment.

All equipment used with oxygen must be labeled to inform patients and health care personnel that oxygen is being used and safety precautions must be observed.

ADMINISTRATION AND MAINTENANCE

The section of NFPA 56B that deals with administration of oxygen during respiratory therapy lists the corrective or preventive action that must be taken to avoid the hazards described above.

APPENDIX

The appendix to NFPA 56B includes a wealth of important information. Subjects discussed include safe handling of equipment, and procedures to follow if a fire occurs.

Instructions and Directives

Investigation of aircraft accidents

Before postmortem examinations of aircraft accident victims, flight surgeons shall give pathologists complete information on circumstances of the accident, aircraft design, life support and protective equipment stored on the plane, and medical histories of accident victims. Autopsy protocols should include results of external, microscopic and radiographic examinations, as well as appropriate photographs and reports of toxicologic studies. Reports of postmortem examinations must be prepared on DD Form 1322. Also, SF 503 (Clinical Record-Autopsy Protocol) should be used to report ancillary data such as microscopic examinations, and DD Form 1323 to report results of toxicologic examinations. Completed reports of postmortem examinations shall be submitted to the investigating flight surgeon within 10 working days after remains are received. Pathologic materials and copies of all reports must be submitted to the Director, Armed Forces Institute of Pathology.

Commanding officers of Navy medical facilities shall provide any support needed by aircraft accident investigators.—BUMED Notice 6510 of 14 April 1977.

Disposition of rehabilitated alcoholic flight personnel

Flight personnel who are receiving Antabuse therapy for alcoholism are disqualified for duty involving flight operations if they are directly involved in flying or air safety. Such personnel include naval aviators, naval flight officers, flight engineers, navigators, communicators, and air traffic controllers. However, BUMED may authorize flying duty for rehabilitated alcoholic personnel whose jobs are "mission essential," such as sensor station operators and flight attendants; requests for the authorization should be submitted via the chain of command to BUMED Code 5111.

Rehabilitated alcoholic aircrew personnel and air controllers shall have complete aviation physical examinations every three months during the first year after they return to duty from an alcohol rehabilitation center. These examinations, to be recorded on Standard Form 88, shall include the flight surgeon's evaluation of the patient's ability to maintain sobriety. The SF 88 shall be forwarded to BUMED Code 5111 for review when the patient is released from inpatient treatment, returns to aircrew or air controller duties, returns to service group I, II, or III, or is restricted from special duty for alcohol-related reasons. Internal medicine and psychiatric evaluations shall be sent to BUMED when the patient returns to flying or air control duties, or is restricted from a special duty assignment for alcohol-related reasons.

Class 1 personnel, when physically qualified, will be returned to service group III status for 3 to 12 months. After that, they may be returned to unrestricted flying. In very carefully considered circumstances, pilots may be returned directly to solo pilot status.—BUMED Instruction 5300.4A of 19 April 1977.

Recovery room record

A new form, NAVMED 6320/16, has been developed for use in all naval medical facilities to provide a comprehensive record of the treatment patients receive in the postanesthesia recovery room. Forms developed locally to record this information shall no longer be used.

The Joint Commission on the Accreditation of Hospitals requires that the Anesthesiologist/Nursing Notes section of the new form include the anesthesiologist's notes about the presence or absence of anesthesia-related complications, and periodic descriptions of the patient's condition and changes in level of consciousness. Only an anesthesiologist should release the patient from the recovery room, unless it is the hospital's written policy that other physicians or nurse anesthetists may release patients.

When the patient leaves the recovery room, the NAVMED 6320/16 is to be placed in the clinical records.

Medical Department personnel who use NAVMED 6320/16 may send their comments and recommendations about this new form to BUMED, Code 721.—BUMED Notice 6320 of 26 April 1977.

Aviation Pathology Program

The site and wreckage of fatal aircraft accidents should be examined by a pathologist as soon after the accident as possible. This investigation should include:

- Review of medical records of crewmember fatalities, to determine medical history and results of physical examinations.
- Review of medical, social, physiological and psychological events associated with crewmember fatalities.
- Examination and photographs of the clothed body of fatalities, with personal equipment intact.
- Radiographs and photographs of unclothed body.
- Gross and microscopic autopsy.
- Special studies of tissues and body fluids.
- Analysis of all pertinent evidence.
- Final report.

The investigation cannot be considered complete without an autopsy of each crewmember fatality—preferably performed by a pathologist trained in aviation or forensic pathology. This autopsy is unique in that the investigator is concerned with establishing or ruling out pathological processes as causative or contributory factors in every aircraft accident. As a member of the accident investigation team, the pathologist seeks to establish the relationship between preexisting disease and the accident, to correlate injuries with factors in aircraft and equipment design, and to study pathological evidence to determine the sequence of events surrounding the accident.

The medical accident investigator shall inform commanding officers, civil authorities, and others in a position to authorize an autopsy of the need for the procedure. A flight surgeon shall assist at the autopsy to ensure that the maximum aeromedical information is obtained. Flight surgeons who find they must perform the autopsy themselves may use NAVMED P-5065, Autopsy Manual, as a guide.

Pathological investigations shall be conducted even when remains are fragmentary or dispersed. Tissue specimens for toxicologic studies may be shipped air freight to the Armed Forces Institute of Pathology. Air mail must not be used. Detailed instructions for preparing and mailing autopsy material are given in this instruction.

When a civilian pathologist performs the autopsy, charges shall be paid by the Medical Department. Bills shall be submitted to BUMED Code 73 through the naval activity authorizing the civilian physician's services.

The tri-service regulation on the Joint Committee of Aviation Pathology is an enclosure to this instruction.—BUMED Instruction 6510.6B of 11 May 1977.

Scholars' Scuttlebutt

Graduate Medical Education Program Directors

Three changes have been made in the list of graduate medical education program directors published in the May 1977 issue of *US Navy Medicine*. This is the up-to-date list:

CDR R. Higgins, MC, USN
Naval Regional Medical Center
Charleston, S.C. 29403

CDR S.A. Borel, MC, USN
Naval Regional Medical Center
Camp Pendleton, Calif. 92055

CAPT C.L. Gaudry, Jr., MC, USN
Naval Regional Medical Center
Jacksonville, Fla. 32214

CDR E.L. Taylor, MC, USN
Naval Aerospace and Regional Medical Center
Pensacola, Fla. 32512

CAPT D.R. Cordray, MC, USN
Naval Regional Medical Center
Portsmouth, Va. 23708

CDR Walter V.R. Vieweg, MC, USN
Naval Regional Medical Center
San Diego, Calif. 92134

CDR D.M. Robinson, MC, USN
Naval Regional Medical Center
Oakland, Calif. 94627

CAPT Q.E. Crews, Jr., MC, USN
National Naval Medical Center
Bethesda, Md. 20014

At the Naval Health Sciences Education and Training Command:
CDR C.T. Cloutier, MC, USN
HSETC Code 4
Bethesda, Md. 20014 Phone: (202) 295-0648

At Bureau of Medicine and Surgery:
CAPT Stanley J. Kreider, MC, USN
BUMED Code 0011
Washington, D.C. 20372 Phone: (202) 254-4279

CDR Clarence B. Mohler, MSC, USN (Ret.)
BUMED Code 314 Phone: (202) 254-4339

Will You Get the Internship You Want?

Navy-sponsored medical students planning to begin their internship next July often ask us, "What are my chances of getting the internship of my choice?"

Here's how the results shaped up for students who began their internship in July this year:

194 got their first specialty choice.

10 got their second specialty choice.

3 got their third specialty choice.

175 were assigned to their first choice of naval regional medical center.

23 were assigned to their second NRMC choice.

9 were assigned to their third NRMC choice.

The chart below shows the number of internship positions offered at naval regional medical centers this year, and the students' preferences for these internships.

Another 24 candidates were selected from the fleet for first-year level programs. These officers are not included in the chart or in the numbers given above.

Candidate Preference for Internships to Begin 1 July 1977

	Medicine				Surgery				OB/GYN				Pathology				Pediatrics				Psychiatry			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
Bethesda	21	35	21	31	13	21	11	15	3	7	2	8	3	6	–	3	3	5	3	10	4	1	4	1
Oakland	17	20	24	20	13	12	21	10	3	5	11	6	2	2	4	1	3	8	7	9	3	5	1	1
Portsmouth	18	16	23	19	13	16	14	13	6	3	5	4	2	2	3	3	5	9	7	4	4	1	1	4
San Diego	32	43	31	26	16	20	18	21	4	12	8	4	3	2	3	3	5	10	13	4	–	–	–	–

	Family Practice			
	A	B	C	D
Camp Pendleton	9	10	5	5
Charleston	9	18	24	8
Jacksonville	9	16	15	22
Pensacola	8	14	13	20

Key: A = number of positions offered
B = number of candidates listing that program as first choice
C = number of candidates listing that program as second choice
D = number of candidates listing that program as third choice

On Duty

A Medical Officer Deploys to the Indian Ocean

LCDR Kenneth L. Andrus, MC, USNR

From July 1976 through March 1977, I served as medical officer on board the USS *Truxtun* (CGN-35) during an eight-month deployment to the Western Pacific. Besides visits to Subic Bay, Hong Kong, Wellington (New Zealand) and Melbourne (Australia), our cruise included two Indian Ocean excursions. This projection of U.S. naval power into the Indian Ocean presented *Truxtun*'s medical department with some unique problems in operational medicine.

Far from help. In the Indian Ocean area, I was immediately impressed by the lack of medical facilities and the prohibitive distances from our ship to the nearest supply points and hospitals. In such situations, medical officers must rely on vigorous preventive medical and dental programs, and acquire a thorough knowledge of available medical resources. Prior planning is essential, and I found the information in the CINCPACFLT port guide, as well as discussions with medical officers who had been in the Indian Ocean, invaluable in preparing for the cruise. In planning for Indian Ocean tours, medical officers should be prepared to give medical assistance to other ships in the area, as I did for the USNS *Wilkes* and a British supertanker when personnel aboard those ships were injured.

Even if you are prepared, you can still be startled by what you find on a port call, as I was when we visited Karachi, Pakistan, and Port Victoria in the Seychelles Islands.

Karachi, the major port city of Pakistan, was a stop on our first Indian Ocean excursion. The city's population has swollen to more than 6 million in the past few years. Public services have not kept pace with this growth, so health and sanitary conditions have suffered. The problems we encountered in Karachi are representative of those seen in many Indian Ocean ports: diseases endemic to the city include rabies, trachoma, ascariasis, hookworm, malaria, hepatitis, polio, amebic and bacillary dysentery, and venereal disease.

Before liberty in Karachi, I mounted an intensive education program to heighten crewmembers' awareness of potential health problems. Nevertheless, many men became ill even after they had exercised extreme caution ashore. Amebic and bacillary dysentery were rampant among the people of Karachi, and 60 of our men contracted one of these diseases. One man acquired a hookworm infection, another required rabies vaccinations after he was bitten by a monkey.

Plan ahead. The big lesson I learned from our experience in Karachi was that to ensure adequate treatment of the crew on an Indian Ocean deployment, certain medical supplies should be ordered well in advance: chloroquine, primaquine, at least two full series of DEV (duck embryo vaccine) rabies vaccine, and at least 250 tablets of metronidazole for every 100 men. Since metronidazole is so expen-

USS Truxtun, **a nuclear-powered guided missile frigate, en route to Indian Ocean**

LCDR Andrus was the medical officer of the USS *Truxtun* from June 1976 through June 1977. He is now serving a residency in internal medicine at Naval Regional Medical Center Portsmouth, Va. 23708.

sive, medical officers may want to substitute diiodohydroxyquin for treating *Entamoeba histolytica*. I found that BUMED Instruction 6230.11G provided valuable information on supplies we would need for our malaria prophylaxis program. I also learned the wisdom of stocking enough Lomotil, Donnatal, Kaopectate, and Combid to allow for treating at least 20% of the crew.

On *Truxtun* we distilled our own water rather than use water of dubious safety from water barges. Although distillation alone is considered cysticidal, our water supply had to be chlorinated and maintained at a level of 3 mg to 5 mg chlorine per liter of water to ensure potability. This chlorination procedure requires tremendous quantities of calcium hypochloride, which must be ordered in advance.

Although we were leery of buying any food in Karachi, we found a reputable local ship's chandler who sold us fruits and vegetables. After the food was inspected thoroughly, it was brought on board and consumed with no ill effects.

An interesting entomological phenomenon occurred while we were at anchor six miles from shore: we were invaded by a horde of flying insects attracted by our lights. For several days, we had to endure flying grasshoppers everywhere!

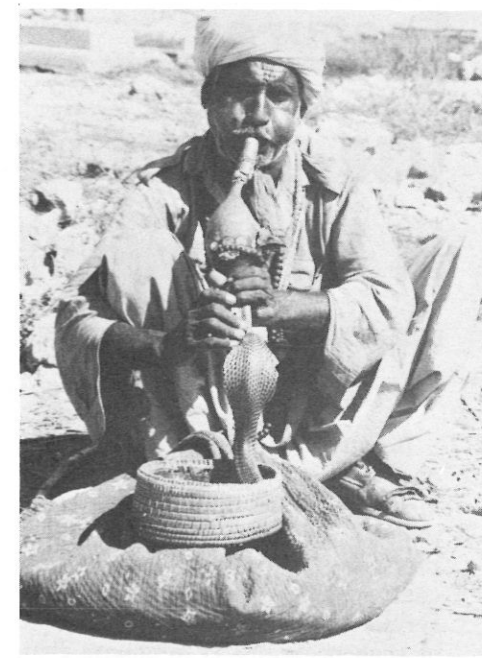
Task force. When *Truxtun* deployed to the Indian Ocean for the second time, we were part of a nuclear-powered task force which included the USS *Enterprise*, USS *Long Beach*, and USS *Tautog*. Because these ships are largely self-sufficient, we spent only four days in port during the eight-week deployment.

Long periods at sea, combined with a lack of "good" liberty ports and erratic mail service, were hard on the crew, so we were fortunate in being able to visit the Seychelles Islands. This is a new country comprising some 96 islands northeast of Madagascar. Mahe Island, on which Port Victoria is located, reminded us of the Caribbean. We had a relaxing stay, sharing the harbor with a French destroyer. Unfortunately, my high school French failed me completely at a reception given for us by the French ship.

The one Government-run hospital, with its open wards around a central courtyard, reminded me of a hospital I had seen in a movie about French Equatorial Africa. The Seychelles facility was operated by British-trained physicians who, although overworked, provided good care to their patients. The food, while good, was delivered haphazardly by the chandlers and was terribly expensive, since much of it is imported from South Africa.

Health conditions on the Islands were quite good, but an unusual medical problem took us by surprise. During *Truxtun*'s visit, local health officials expressed concern over an outbreak of a new illness that resembled dengue fever. Thus forewarned, I was prepared for the baffling set of symptoms I saw in five crewmembers who abruptly presented with fevers as high as 103°F, malaise, myalgia, flank pain, retro-orbital headache, and ocular pain, especially on lateral gaze. Our men, who were not affected as seriously as were the islanders, improved after only conservative therapy. Acute and convalescent sera we collected were sent to Environmental and Preventive Medicine Unit No. 5 in San Diego for serological analysis, while COMNAVSURFPAC and EPMU-7 in Naples provided guidance and assistance after we filed a disease alert report. (Although we ordinarily could have called on EPMU-6 in Subic Bay for assistance, EPMU-7 in Naples was closer.)

Medevacs. Depending on where we were operating, our patients could have been aeromedically evacuated via Diego Garcia to Naval Hospital Subic Bay, to Naval Regional Medical Center Naples, or to an Army hospital in Frankfurt, Germany. I quickly found that it was advisable to keep tabs on what Indian Ocean ports had hospitals which could handle problems beyond the capabilities of my department. One of our men with suspected obstructive liver disease was aeromedically evacuated from Karachi to Naval Hospital Subic Bay for observation and treatment. Operating with the nuclear-powered task force proved to be advantageous because in areas where medical facilities were lacking and aeromedical evacuation difficult, the hospital and surgical capabilities of the *Enterprise* were invaluable.



A familiar sight in Karachi, Pakistan

I left the Indian Ocean with a number of observations. Medical support, although often far away, was still accessible. A continuing awareness of potential health problems and sources of assistance was essential. Finally, special attention must be paid to long-range planning for medical supplies, to ensure that adequate amounts of necessary supplies are aboard and that adequate lead time is allowed for their delivery.

For those Navy medical personnel who venture into the Indian Ocean, its ports provide fascinating visits and a chance to practice a challenging type of operational medicine.

Use of Inpatient Adjunct Services in Naval Hospitals

LCDR R.A. Payton, MSC, USN LT W.L. Roach, Jr., MSC, USN

Because of increased emphasis on improving the cost effectiveness of medical care through utilization reviews, hospitals are establishing programs of admission certification, continued stay review, and ancillary service utilization review. The goal of such programs is to ensure that patients receive services appropriate for treatment of their illnesses. Under Professional Standards Review Organization (PSRO) legislation, hospitals must inform federal and state agencies of the diagnoses of patients who are beneficiaries of Medicare, Medicaid, and maternal and child health programs, and of the ancillary services provided to these patients. Payments for unjustified ancillary services which exceed PSRO criteria for a particular diagnosis may be denied.

EFFECT OF HOSPITAL SIZE

The range of ancillary services provided to hospitalized patients is wide. Patients in the same hospital with the same diagnosis do not always receive the same number and type of ancillary services. Many variables affect the physician's decision to use a specific diagnostic or therapeutic service in a patient's therapy.

What effect does the size of the medical treatment facility have on the volume of service provided to patients? We have analyzed the number of adjunct services received by inpatients in selected naval hospitals in the continental United States (CONUS) to determine variation among hospitals of different sizes. The effect of hospital size on the volume of adjunct services can be seen by determining the amount of inpatient adjunct services* provided for each admission.

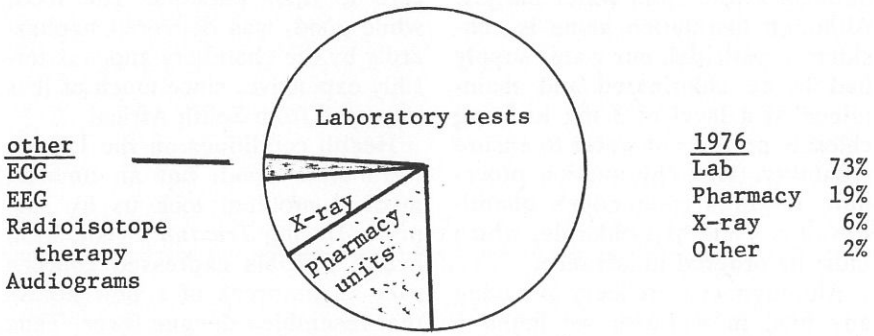


Figure 1. Composition of inpatient adjunct services provided by naval medical centers and hospitals in CONUS, 1976. (1)

In shore-based naval inpatient medical facilities, more than 98% of inpatient adjunct services fall in one of three categories: laboratory tests, X-ray film exposures and pharmacy units (*1*). Over a short term, from 1973 to 1976, the mix of services provided in naval medical centers and hospitals in CONUS remained relatively constant, while the volume of services rendered increased from 14.7 million (*2*) to more than 18.7 million (*3*). Figure 1 illustrates the percent of adjunct services provided to inpatients in naval medical facilities in 1976.

Based on FY76 data, we stratified selected naval medical facilities in CONUS by average daily patient load (ADPL) into four classes: 400 or greater ADPL, 200-399 ADPL, 100-199 ADPL, and ADPL less than 100 (see Table). The average number of inpatient adjunct services per admission (total inpatient adjunct services divided by the total number of admissions) for the naval medical facilities we analyzed for FY76 was 93. As shown in Figure 2, the larger medical centers clearly provide more adjunct services for each patient admitted. In fact, in 1976 inpatients in the "more than 400" facilities used 44% more services than the overall average for each admission, and 153% more services than inpatients admitted to facilities

*The Navy Medical Department defines inpatient adjunct services as laboratory tests, pharmacy units, pulmonary function studies, X-ray film exposures, audiograms, dialysis procedures, electrocardiograms, electroencephalograms, radioisotope studies, fluoroscopic exams, and radium and radioisotope therapy.

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in the 100-199 ADPL category. It must be noted that all facilities in the "more than 400" group have postgraduate medical education programs and are core hospitals of large naval medical regions; the large number of ancillary services used in these hospitals is partly attributable to the "teaching effect" and to the large proportion of patients with complex diagnoses who tend to require more adjunct services.

Noteworthy, too, was the increase from 1973 to 1976 in the amount of adjunct services provided for each admission. The increased rate of service for "more than 400" facilities—33%—paralleled the average overall increase of 33%. The constant annual increase in inpatient services for all categories amounted to 9.9% from 1973 to 1976. In one naval medical treatment facility in the 200-399 ADPL category, the number of admissions for 1976 was 30% less than in 1973, while the number of adjunct services was 38% higher for the same two years (*5,8*). For all facilities studied, the number of inpatient adjunct services was 37% higher in 1976 than in 1973, while the number of admissions increased only 2% during the same period (*5,8*).

The American Hospital Association, in its analysis of civilian medical facilities, reported a general correlation between hospital size and distribution of most services: as hospital size increased, so did the likelihood that the hospital would offer a particular service (*9*). This correlation was strongest for services that require complex equipment, a large capital investment, and highly skilled technicians.

LABORATORY TESTS

The growth of medical technology has given the physician increasingly varied types of laboratory procedures. Can we reduce the number and type of laboratory tests used in our hospitals but still provide the physician with enough tools to make sound medical decisions? A recent

TABLE. Inpatient Adjunct Services Per Admission in Selected Naval Medical Centers and Hospitals, 1973-1976

Facility	Average Daily Patient Load (ADPL) 1976[a]	Inpatient Adjunct Services/Admission 1973[b]	1974[c]	1975[d]	1976[a]
Over 400 ADPL					
NRMC San Diego	766	95	107	108	99
NRMC Portsmouth	578	98	117	118	152
NNMC Bethesda	468	138	123	156	191
NRMC Philadelphia	415	81	90	105	146
	Average	101	110	118	134
200-399 ADPL					
NRMC Oakland	352	90	86	75	74
NRMC Camp Pendleton	245	47	49	56	75
NRMC Camp Lejeune	224	43	48	43	48
NRMC Long Beach	212	74	94	87	100
NRMC Great Lakes	203	54	76	120	120
	Average	63	71	73	80
100-199 ADPL					
NRMC Jacksonville	194	59	64	93	80
NRMC Charleston	169	61	51	66	53
NARMC Pensacola	126	51	62	70	74
NH Orlando	117	30	36	30	31
NH Beaufort	100	21	25	22	22
	Average	44	48	55	53
Less than 100 ADPL					
NRMC Bremerton	95	29	45	42	42
NH Memphis	83	46	44	69	76
NRMC Newport	68	37	47	86	70
NH Corpus Christi	58	34	42	65	66
NSMC New London	56	34	47	59	83
NH Quantico	42	32	34	26	20
NH Key West	29	43	45	48	45
NH Annapolis	26	35	33	40	34
NH Patuxent River	16	29	20	24	38
	Average	36	41	49	55
	Overall average	70	78	84	93

a. **Statistics of Navy Medicine**, NAVMED P-5028, Vol. 32, No. 4, 1976.
b. **Statistics of Navy Medicine**, NAVMED P-5028, Vol. 29, No. 4, 1973.
c. **Statistics of Navy Medicine**, NAVMED P-5028, Vol. 30, No. 4, 1974.
d. **Statistics of Navy Medicine**, NAVMED P-5028, Vol. 31, No. 4, 1975.

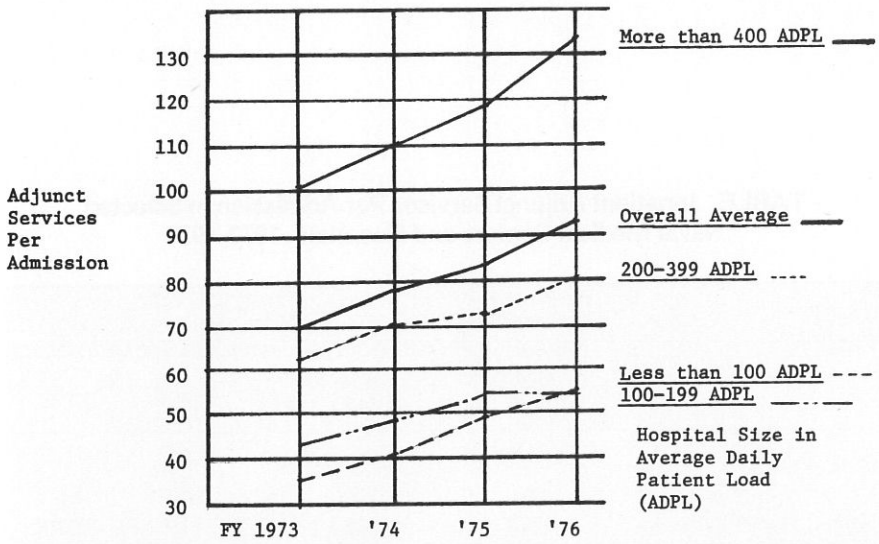

Figure 2. Inpatient adjunct services per admission in selected naval medical centers and hospitals in CONUS. (5-8)

study performed in Canadian hospitals (*10*) revealed that when constraints were imposed on ordering laboratory tests, practicing physicians showed a greater tendency than house staff members (clinical clerks and residents) to disregard tests, depending instead on their previous experience and on the physical examination of the patient. The researchers found that house staff physicians frequently ordered more tests as a measure of caution, since there were abundant laboratory facilities. When constraints were introduced, both practicing physicians and house staff members took more risks in reducing screening measures and tests for secondary diagnoses. Further, it appeared that under the pressures of limited test ordering, both residents and seasoned physicians discarded tests required for hospital accreditation, such as urinalyses and hemoglobin counts. Despite benefits gained from the reduced demand for services, however, the study advocated a cautious approach to limiting laboratory use, to avoid any negative impact on physician efficiency.

Statistics from the American Hospital Association's Hospital Administrative Services section show that larger hospitals provide more clinical laboratory services than smaller hospitals, but that the cost per test is less in larger hospitals than in smaller hospitals (*11*). This lower cost may be due in part to the degree of automation in clinical laboratories of larger hospitals. The fact that in hospitals with more than 300 beds fewer tests are performed per man-hour than in hospitals with under 300 beds suggests that only a standard core of tests is automated. In larger hospitals, labor productivity is decreased by nonroutine tests which may require time-consuming, sophisticated hand analysis. Increased test complexity partly accounted for a decrease from 1969 to 1972 in the number of tests performed per man-hour in all hospitals studied by the AHA (*12*).

Hospital medical staffs establish the minimum number of laboratory and radiographic tests required for all patients admitted. Do these requirements lead to unnecessary overuse of laboratory and radiology services? How much benefit does the patient derive from these required tests? Are they valid for all patients admitted? Should the admitting physician determine which and how many tests to order for each patient on admission, or should the hospital medical staff require that certain tests be performed for every patient on admission? Does the hospital know what percent of patients receive the minimum required admission tests?

Statistics from the Professional Activities Study sponsored by the Commission on Professional and Hospital Activities, Ann Arbor, Mich., revealed that in 1975 less than half of all inpatients in one naval regional medical center were receiving the minimum required laboratory tests. Analysis of patient records revealed that large numbers of patients were not receiving a VDRL test for syphilis, one of the required admission tests. After discussing the requirement for this particular test and the value of the test for pediatric and other selected groups of patients, the hospital's Quality Assurance Program Committee recommended that the VDRL test be eliminated as a requirement on admission. This is just one instance in which the use of Professional Activity Study statistics helped a naval medical staff establish better policies and procedures to promote quality patient care.

Preadmission testing programs need to be analyzed to obtain information on the number of tests performed on inpatients before admission. In the Navy, tests done before admission are recorded as outpatient tests. In some hospitals, the patient mix may allow a greater percent of preadmission testing than in other hospitals. The availability of certain tests and the willingness of the medical staff to perform some tests on an outpatient basis also influence the number of outpatient tests performed.

The ability of hospitals to perform ancillary tests on a less costly outpatient basis and the use of this cheaper form of treatment vary extensively among hospitals. For example, recently instituted medical holding companies in Navy hospitals may affect the volume of services provided to inpatients; clinical studies previously performed late in a patient's hospitalization are now being done after active-duty inpatients are discharged to duty in the medical

holding company and before they return to full duty. This discharge reduces the volume of tests performed on inpatients while increasing the number of tests performed for each outpatient.

CONCLUSIONS

Many other questions relating to this discussion could be addressed. How much of the increase in use of ancillary services is attributable to physicians practicing "defensive medicine" for fear of malpractice suits? How much of the increase is caused by the "teaching effect"? How many tests have been repeated because an inexperienced technician or student made a mistake? What effect does the free cost of medical care in military facilities have on the use of ancillary services there? How many tests are reordered by physicians because they question the accuracy of the initial tests, rather than leaving quality control to the pathologist? How many tests have been reordered because the initial results were lost or misfiled?

Inpatient adjunct service statistics (*8*) indicate that fewer services per admission (44% less than the overall average for FY76) are used by patients in hospitals primarily supporting Marine Corps activities. This fact may be attributed to a population of less ill active-duty patients who may have been admitted only to remove them from a work environment which may have been aggravating their condition. Some other level of care might adequately meet these patients' needs. Hospitalization of such patients may not be the best solution to a problem which should be solved by a much less costly alternative.

Empirical studies have not been performed in naval medical facilities to answer all the questions we have posed. Perhaps the questions cannot be answered by measuring empirical data. An effective utilization review program can give health care professionals a viable means to control and eliminate unjustified medical care. More attention needs to be devoted to analyzing performance data in naval medical facilities —only by looking at performance data can we obtain the information we need to evaluate the effectiveness of medical care. Continued analysis and examination of hospital performance will highlight problem areas. Using positive and innovative approaches, we can identify the real problems of health care delivery and ensure the best use of our resources.

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DON'T MISS

Pulmonary Function Testing in Occupational Medicine

Biological monitoring such as spirometry, along with industrial hygiene practices, comprises the core of any effective occupational health endeavor. Now, a new technical manual from the Navy Environmental Health Center clarifies the essential requirements of a practical pulmonary function screening program.

In "Pulmonary Function Testing in Occupational Medicine," LCDR Edward P. Horvath, Jr. (MC) tells how to select and calculate specific spirometric tests, and how to interpret baseline and followup spirograms. Also discussed are spirometers and instrument specifications.

Routine assessment of pulmonary function is becoming increasingly common in preemployment and periodic physical examinations of industrial workers. The Navy, for example, requires pulmonary function studies for workers exposed to asbestos, beryllium, and isocyanates. Combined with a careful history and physical examination, such preplacement screening can identify job applicants who have preexisting functional impairment or who are unusually susceptible to airborne substances. Regular followup studies can help detect respiratory impairment early enough for therapy to be beneficial.

Properly implemented pulmonary function screening programs will help fulfill the intent of the Occupational Safety and Health Act and ensure safe and healthful working conditions for the Navy's men and women.

Copies of LCDR Horvath's report may be obtained from the Navy Environmental Health Center, 3333 Vine St., Cincinnati, Ohio 45220. Ask for Technical Manual 77-1.

Teaching Diabetic and Cardiac Patients: New Guidelines

CAPT J.S. Shaw, NC, USN LCDR J.H. Smith, NC, USN

For the past two years, nursing personnel at Naval Regional Medical Center Bremerton, Wash., have used guidelines developed by LT Susan Shumaker, NC, USNR to instruct patients with diabetic or cardiac conditions.

While charge nurse on the medical ward, LT Shumaker had found that her staff was reluctant to begin any instruction of diabetic or cardiac patients because they were unsure of what kind of instruction or how much information the patients needed. LT Shumaker faced other problems as well: When should the instruction begin? How detailed should the instruction be? Should nurses use ordinary language or medical terminology when teaching patients about their illness? How could the staff resolve inconsistencies between the information medical officers gave patients and the instructions given by nurses assigned to the unit?

To overcome the haphazardness of the teaching plan then being followed, LT Shumaker compiled two manuals: "Myocardial Infarction: Guidelines for Teaching Patient and Family" and "Diabetes Mellitus: Guidelines for Teaching Patient and Family." The manuals were approved by the chief of the Medical Service and members of his medical staff. All diabetic and cardiac pa-

CAPT Shaw is assistant chief of the Nursing Service, Naval Regional Medical Center Bremerton, Wash. 98314. LCDR Smith was formerly educational coordinator at NRMC Bremerton and is now studying for an M.S. degree in nursing at the University of Washington in Seattle.

LT Susan Shumaker (NC) shows a hospital corpsman how to help patients learn to calculate their insulin dosage.

Acting the role of a diabetic patient, the hospital corpsman draws up his insulin dosage following nurse's instructions.

LT Shumaker and hospital corpsman review instructions in the training manual for teaching diabetic patients.

tients at NRMC Bremerton now receive instruction about their illness according to the guidelines outlined in these manuals.

The manuals, whose 20 to 30 pages are assembled in a looseleaf notebook, are written in both lay and medical terminology. This helps the teacher—whether Nurse Corps officer, licensed practical nurse, hospital corpsman or nursing assistant—to clearly understand the contents and to teach patients of various educational levels. In addition to illustrations, charts, and diagrams, the manuals include American Heart Association and American Diabetic Association literature which is given to each patient along with the addresses of local resource agencies.

The guidelines help staff members to:

- Determine the best time to begin teaching the patient;
- Assess each patient's learning needs;
- Arrange the sequence and amount of information to be taught each day.

Once the teaching program begins, nurses' notes document each patient's progress and level of comprehension. Nursing Care Plan II (NAVMED 6550/1A) is used to record how much information is covered in each teaching session. Although the nurse alone is responsible for seeing that all instruction is completed and documented before the patient's discharge, all staff members are encouraged to become involved in the program.

The chief results of these efforts are that patients and their families obtain clear and relevant information about specific diseases affecting them, and that the patient's understanding of this information is monitored. Medical center internists are assured that instruction of cardiac and diabetic patients begins promptly, and are provided daily reports on what the patients and their families are learning. Follow-up home visits by Navy Relief nurses become more productive because the nurses can reinforce what the patients have learned and help them adjust to any changes in lifestyle caused by their illness.

Since the guidelines have been introduced at NRMC Bremerton, nursing staff members have become more comfortable with their teaching assignments and have been better able to document the results they achieve. Medical and nursing audits, too, show considerable improvement in documenting the patient's progress, both medically and in terms of knowledge and awareness of the disease.

The standardized guidelines developed by LT Shumaker have been made available to nurses throughout the region. And the work continues. Nurses at NRMC Bremerton are studying the possibility of developing guidelines for teaching patients who suffer from other chronic conditions, and for teaching new mothers how to care for their babies.

[**NOTE:** Single copies of universally applicable sections of the guidelines described in this article are available from the Bureau of Medicine and Surgery (Code 322) upon request by directors of nursing services in Navy health care facilities. Ed.]

CPR Training at Pax River

On 30 April, Naval Hospital Patuxent River, Md., hosted a cardiopulmonary resuscitation-basic life support instructors' course for Navy members and local civilians. The training, which met requirements of the American Heart Association and American Red Cross, qualified 13 new instructors to teach at the Naval Air Test Center, Patuxent River, and in neighboring communities.

Course director LCDR Lou E. Bell (NC) of the hospital staff has taught CPR instructor courses and basic CPR classes for the past two years. Her teaching staff includes two hospital corpsmen, a Red Cross trainer, a high-school teacher, and a nurse from a nearby civilian hospital.

All CPR instructors' courses approved by the American Heart Association require that a special training mannequin, "Recording Resusci-Anne," be used to give students visual and recorded evidence of their performance. LCDR Bell had four mannequins: three were on loan for the day, but the fourth had recently been donated to the hospital by a local wives' club.

LCDR Bell (second from left) demonstrates CPR technique on mannequin

Simplified Record-Keeping for a Centralized Intravenous Admixture Program

LCDR Larry L. Karch, MSC, USN
LCDR W. Frank Morris, Jr., MSC, USN
LT Walter A. Ollenburg, MSC, USN

The Pharmacy Service of Naval Regional Medical Center Charleston, S.C., started to implement its Centralized Intravenous Admixture Program in February 1975. First, we prepared intravenous admixtures for continuous therapy, such as electrolytes and mixtures for providing total nutrition by parenteral routes. We introduced the new admixtures to one ward at a time until all wards were using them.

In July 1975, we began the second stage of the program: preparing intravenous admixtures, such as antibiotics and antineoplastics, which are administered intermittently from partially filled minibottles and "piggyback" administration sets. Again, we worked with one ward at a time until all wards were using the new admixtures.

Under the program, one pharmacy officer and a pharmacy technician provide intravenous admixture service from 0730 to 1630 daily.

When we planned the program, we designed a two-part intravenous admixture order form (Figures 1 and 2) composed of a top sheet made from soft paper and a hard cardboard copy underneath. We also developed an intravenous admixture schedule card (Figure 3) duplicated from the back of DD Form 1348, a type of supply requisition.

The original, soft copy of the intravenous admixture order stays in the patient's chart on the ward, while the hard copy is taken to the pharmacy. There the order is evaluated, a schedule card is prepared, labels are typed, and the hard copy is filed. The labels are then clipped to the schedule card, which is filed in front of an index tab indicating the time the next bottle scheduled on that card must be administered. As each admixture is prepared, the manufacturer's name, the medication lot number, and other pertinent information are recorded on the back of our file copy of the order form.

Orders telephoned to the pharmacy are recorded on a schedule card. When the first dose is delivered to the ward, the dose is compared with the physician's orig-

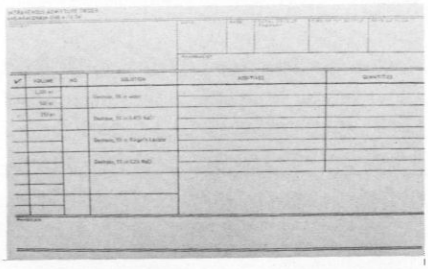


Figure 1. Front of intravenous admixture order form.

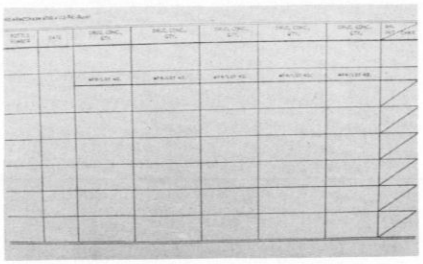


Figure 2. Back of intravenous admixture order form.

Patient_____ Ward_____ Date_____ Dr._____

Solution_____ Rate of Admin._____

Additives_____ Comments_____

#1_____ #2_____ #3_____

#4_____ #5_____ #6_____

#7_____ #8_____ #9_____

#10_____ #11_____ #12_____

INTRAVENOUS ADMIXTURE SCHEDULE CARD

Figure 3. Intravenous admixture schedule card before revision.

LCDR Karch, formerly chief of the Pharmacy Service at Naval Regional Medical Center Charleston, is now chief of the Pharmacy Service of Naval Regional Medical Center Newport, R.I. 02840. LCDR Morris is chief, and LT Ollenburg is a staff pharmacist, at the Pharmacy Service, Naval Regional Medical Center Charleston, S.C. 29408.

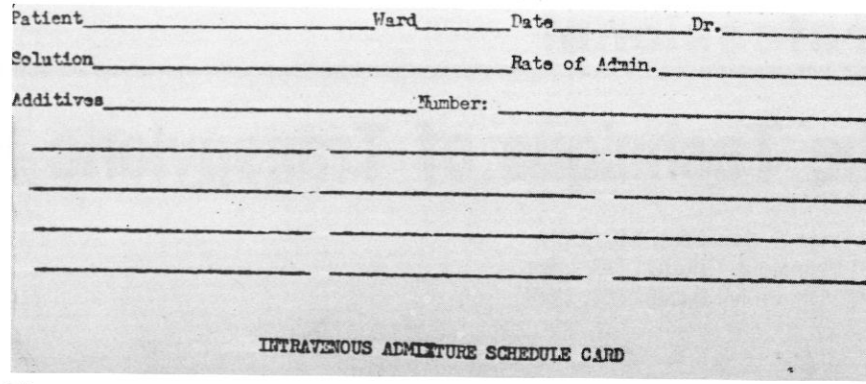
inal order in the patient's chart before the admixture is released. Then the hard copy of the order is taken to the pharmacy and filed, after the manufacturer's name, the drug lot number, and other pertinent information are written on the back.

CHANGES

We soon found that on new I.V. admixture orders the first bottle we prepared was often the second, third or fourth bottle the patient received. This happened when physicians decided to start a patient immediately on an I.V. admixture, or when I.V. admixture service was not available. Nurses would then prepare the admixture right on the ward, and the patient had already been given several bottles by the time we received the order. Thus, the bottle marked #1 on our schedule card was not really the first bottle the patient had received. Consequently, we eliminated the printed numbers from the card—leaving only blank lines—so we could number each bottle accurately (Figure 4).

Preparing intravenous admixtures for intermittent administration caused a big increase in our workload, which led to further changes in the program. We realized that we were spending too much time retrieving the hard copy of the order form from our files solely to record the manufacturer and lot number for each bottle we prepared. We solved this problem by printing blocks on the back of the schedule card (Figure 5) so we could use this card, instead of the order form, to record the manufacturer, medication lot number and other pertinent information. At the same time we added extra lines to the front of the schedule card so that more doses could be scheduled and recorded.

Another change was made when it became apparent that most of our "piggyback" orders were for the same medications and similar doses. We pre-printed labels so that the only information we have to type in is the patient's name, ward, and the administration time, dose, and volume of medication.


Patient_____ Ward_____ Date_____ Dr._____

Solution_____ Rate of Admin._____

Additives_____ Number: _____

INTRAVENOUS ADMIXTURE SCHEDULE CARD

Figure 4. Revised schedule card.

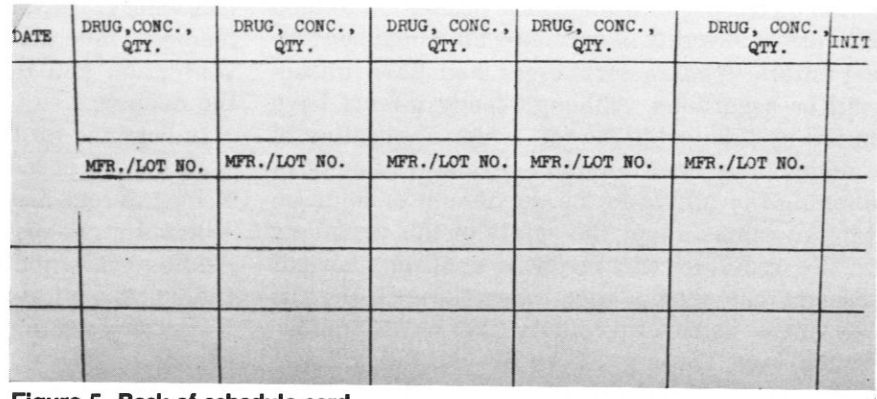
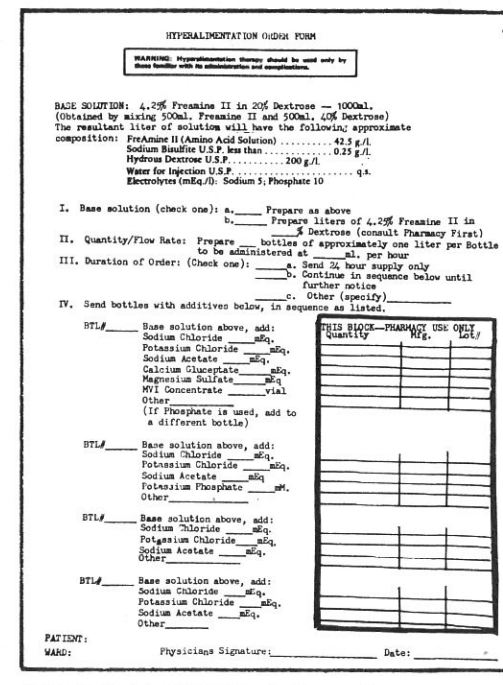

DATE	DRUG, CONC., QTY.	DRUG, CONC., QTY.	DRUG, CONC., QTY.	DRUG, CONC., QTY.	DRUG, CONC., QTY.	INIT
	MFR./LOT NO.	MFR./LOT NO.	MFR./LOT NO.	MFR./LOT NO.	MFR./LOT NO.	

Figure 5. Back of schedule card.

For hyperalimentation orders, we designed a streamlined order form (Figure 6) which also serves as a pharmacy worksheet because it has blocks for recording the manufacturer and lot number. After a physician writes a hyperalimentation order, the order form is delivered to the pharmacy, where we make a copy for pharmacy files. The original order is returned to the ward to be attached to the patient's chart.

Two wards are now on a modified unit-dose program. I.V. admixture orders for these areas are transferred directly from a copy of the physician's original order to the intravenous admixture schedule card, obviating the need for the order form. Someday we may no longer need the order form for any I.V. admixture.

We believe that more changes, either by design or of necessity, are inevitable to keep our program running smoothly.


HYPERALIMENTATION ORDER FORM

WARNING: Hyperalimentation therapy should be used only by those familiar with its administration and complications.

BASE SOLUTION: 4.25% Freamine II in 20% Dextrose — 1000ml.
(Obtained by mixing 500ml. Freamine II and 500ml. 40% Dextrose)
The resultant liter of solution will have the following approximate composition: FreAmine II (Amino Acid Solution) ..... 42.5 g/l.
Sodium Bisulfite U.S.P. less than ..... 0.25 g/l.
Hydrous Dextrose U.S.P. ..... 200 g/l.
Water for Injection U.S.P. ..... q.s.
Electrolytes (mEq./l): Sodium 5; Phosphate 10

I. Base solution (check one): a.____ Prepare as above
b.____ Prepare liters of 4.25% Freamine II in ____% Dextrose (consult Pharmacy First)

II. Quantity/Flow Rate: Prepare ___ bottles of approximately one liter per Bottle to be administered at ____ ml. per hour

III. Duration of Order: (Check one): _____a. Send 24 hour supply only
_____b. Continue in sequence below until further notice
_____c. Other (specify)_____

IV. Send bottles with additives below, in sequence as listed.

BTL#____ Base solution above, add:
Sodium Chloride ____mEq.
Potassium Chloride ____mEq.
Sodium Acetate ____mEq.
Calcium Gluceptate ____mEq.
Magnesium Sulfate ____mEq
MVI Concentrate _____vial
Other _____
(If Phosphate is used, add to a different bottle)

BTL#____ Base solution above, add:
Sodium Chloride ____mEq.
Potassium Chloride ____mEq.
Sodium Acetate ____mEq
Potassium Phosphate ____mM.
Other _____

BTL#____ Base solution above, add:
Sodium Chloride ____mEq.
Potassium Chloride ____mEq.
Sodium Acetate ____mEq.
Other_____

BTL#____ Base solution above, add:
Sodium Chloride ____mEq.
Potassium Chloride ____mEq.
Sodium Acetate ____mEq.
Other_____

THIS BLOCK—PHARMACY USE ONLY
Quantity | Mfg. | Lot#

PATIENT:
WARD: Physician's Signature:_____ Date:_____

Figure 6. Hyperalimentation order form.

The Technique of Transpyloric Feeding

CDR Brian S. Saunders, MC, USN
CAPT Reinald J. Chutter, DC, USN
CAPT William M. Bason, MC, USN

In 1967, 1970, and 1973, Rhea and associates (*1-3*) reported on the use of transpyloric intubation to feed premature or severely ill neonates for whom conventional enteric feeding techniques had been unsuccessful or hazardous. Although many infants have been fed by this technique (*4*), wider application of the method has been hindered by the difficulty of positioning the tubing in the duodenum or jejunum and by questions about the safety of the technique (*5-9*). We undertook this review to confirm what our experience has shown, that transpyloric feeding is not as simple as several reports (*2-4*) have implied.

Transpyloric feeding offers several advantages over the gavage feeding method. First, the stomach is bypassed, greatly reducing the risk of vomiting and aspiration. Bypassing the stomach also eliminates the problem of gastric distention frequently seen when neonates are fed by gavage, and thus prevents the apnea and bradycardia associated with gastric distention (*10*). Because gastric emptying is frequently delayed in small or ill neonates, the amount of food these infants can consume by the alimentary route is limited. When adequate calories are provided by the transpyloric route early in the neonate's life, the need for hypercaloric formulas and nonalimentary feeding routes is reduced. In a small, controlled trial of gavage and transpyloric feeding, Wells and Zachman have shown that feedings may be started significantly sooner and that early weight gain is significantly greater in neonates fed by the transpyloric route than in neonates fed by gavage (*11*).

Infants with respiratory distress from any cause may be fed safely by the transpyloric route, including patients using "open" techniques of assisted ventilation such as nasal prongs or continuous positive airway pressure given through a face mask. Physicians may continue transpyloric feeding while the infant is weaned from assisted ventilation and during endotracheal extubation of the neonate.

Indications for transpyloric feeding are:

- Birth weight less than 1500 gm.
- Respiratory distress syndrome.
- Respiratory distress secondary to any cause, including aspiration syndromes, pneumonia, pneumothorax, and surgery.
- Assisted ventilation, especially with "open" techniques.
- During weaning from assisted ventilation.
- During endotracheal extubation.
- Failure to tolerate gavage feedings, as shown by large gastric residuals and vomiting.
- Apnea and bradycardia, especially the forms related to gastric distention.

METHOD

To intubate transpylorically, two items are required: a properly measured length of medical tubing, and a gold weight which is placed on the end of the tubing.

A 0.5 gm gold weight facilitates placement of the tubing through the pylorus and into the small bowel. These weights are custom-made in a dental prosthetics laboratory from readily available dental materials (see figure). The amount of gold required to manufacture each weight costs approximately $3 at the current market value of $132 per ounce.

The gold weight is swedged onto the end of a #5 French feeding tube, and a feeding hole smaller than one-third the circumference of the tube is cut as close to the weight as possible. The prepared tubing is sterilized with ethylene oxide gas.

Although polyvinyl chloride is the material used most commonly to manufacture medical tubing, several problems in its use have recently been

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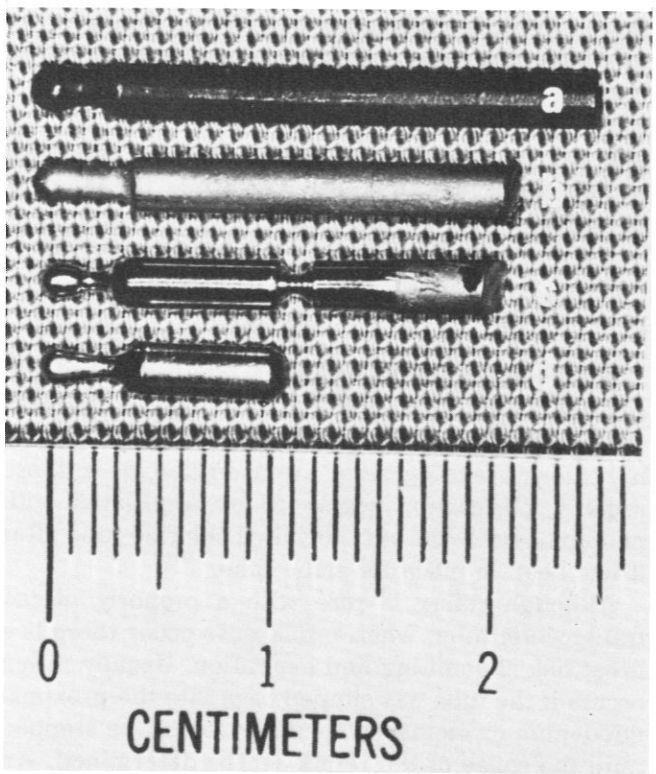

Steps in the manufacture of a gold weight for transpyloric intubation: (top to bottom) wax pattern, rough casting, partly finished weight, and finished gold weight.

recognized. Approximately 40% of the dry weight of polyvinyl chloride tubing is a plasticizer, Di-(2-ethylhexyl) phthalate, which leaches out of the tubing and may be absorbed in the infant (*12*). The toxicity of plasticizers is unknown. Furthermore, after exposure to the environment of the small intestine for a period as short as 24 hours, polyvinyl chloride tubing becomes much less flexible, and has been associated with traumatic perforation of the bowel (*5,6,8*). For these reasons, polyvinyl chloride tubing should not be used for transpyloric intubation.

Silastic tubing, while apparently safe, is difficult to use because of its extreme flexibility. The proper positioning of silastic tubing requires an introducer catheter or wire (*2,3,13*); however, the introducer wire is unsafe and should not be used.

Polyurethane tubing recently has been evaluated as a safe alternative for transpyloric intubation (*14*). It is apparently nontoxic and firm enough to pass without an introducer. We have seen that it does not deteriorate or change its physical properties after being exposed to the small bowel environment for as long as 44 days.

The length of tubing required to place the tip into the stomach is estimated by measuring the distance from the tip of the neonate's nose to the tragus of the ear to the xyphoid process. If too much tubing is placed in the stomach, the tubing will coil and the intubation attempt will probably fail. The tubing is passed through the neonate's nose or mouth the premeasured distance and taped in place. After the patient is placed in the right lateral decubitus position for 10 minutes, an additional 15 cm to 20 cm of tubing are passed into the stomach. The tip should be in place in the small bowel within 10 to 15 minutes; occasionally a longer time is required for the tubing to enter the small intestine. Position may be confirmed by X-ray or by the appearance of bile-stained material in the tubing. If the gold tip of the tubing is in the third portion of the duodenum or beyond, the position is satisfactory. Using this technique, we have successfully intubated more than 95% of our patients who required transpyloric feeding.

The tubing is taped in a gentle arc from the alae nasi so there is no stress on the alae nasi or the nasal septum. Careless taping may lead to necrosis of the nasal structures.

FORMULA OSMOLALITY

The maximum osmotic tolerance of the small intestine is between 350 and 400 mOsm/kg (*4,13*). Commercial 20 kcal/oz formulas and breast milk have osmolalities of approximately 300 mOsm/kg and are suitable for transpyloric feeding (see table). All elemental (predigested) formulas are hypertonic and must not be used.

Formula osmolality is the sum of the osmolalities of all osmotically active particles in the formula. Renal solute load can be estimated from the formula's sodium, potassium, chloride and nitrogen content—the elements excreted by the kidney (*15*). Carbohydrates, major contributors to formula osmolality, are metabolized to carbon dioxide and water, and therefore do not contribute to the renal solute load. Thus, total solute concentration of a formula (osmolality) has little relation to renal solute load and, conversely, renal solute load does not describe total formula osmolality (*15*). For example, Pregestamil, an elemental diet with a renal solute load of approximately 190 mOsm/kg, has a formula osmolality of approximately 715 mOsm/kg. The infusion of Pregestamil or another hypertonic formula directly into the small intestine will cause severe diarrhea and loss of fluid and electrolytes.

The small intestine is not a reservoir, so bolus feeding may induce reflux of formula into the stom-

TABLE. Osmolality of Several Formulas

Formula	Renal Solute Load* (mOsm/kg)	Osmolality** (mOsm/kg)
Similac 13	104	185
Similac 20	156	290
Similac 24	189	357
Similac PM 60/40, 20 calories	119	306
Enfamil 13	82	195
Enfamil 20	128	293
Enfamil 24 (premature formula)	152	429
SMA 13	59	191
SMA 20	91	300
SMA 24	110	364
Isomil 20	160	200
Pro-So-Bee 20	200	252
Nursoy 20	128	244
Pregestamil	194	715
Nutramigen	195	468
D_5W	0	260
$D_{10}W$	0	520
Breast milk	100	290
Cow's milk	282	362

*Calculated value (method used by Ziegler and Fomon, **15**).
**Mean measured values supplied by manufacturer. There is minor variability from batch to batch.

ach. For this reason, an infusion pump is used to administer formula at a steady rate. An oral gastric tube is passed and the stomach is aspirated every two to four hours to check for reflux of formula. Ideally no formula should be seen in the stomach, although 1 cm^3 to 2 cm^3 of bile-stained secretions is common, and is acceptable. These secretions should be replaced through the gastric tube to prevent unnecessary electrolyte and fluid loss.

Feedings for infants who weigh more than 1200 gm may be started with 20 kcal/oz iso-osmotic formula, which should be infused at a steady rate calculated to give the infants their daily fluid needs. Once the infant's tolerance is demonstrated, the infusion rate may be increased.

Great caution must be exercised in delivering formula to infants weighing less than 1200 gm, in whom the chance of reflux of formula and the risk of vomiting and aspiration are greater. Feeding should begin with half-strength formula, 10 kcal/oz (approximately 150 mOsm/kg), infused slowly at a rate of 1 to 2 cm^3/hour. The volume of formula is increased slowly in amounts the infant can tolerate to reach the infant's fluid maintenance in 12 to 24 hours. After this level has been reached, caloric strength is increased gradually to 20 kcal/oz; the volume of formula is then increased to provide between 120 and 150 kcal per kg per day. Again, the physician should check for reflux of formula into the stomach by using an oral gastric tube.

COMPLICATIONS

Since transpyloric feeding was introduced in 1970, several complications have been reported, particularly perforation of the small intestine when polyvinyl chloride feeding tubes are used (*5,6,8*). In these reports, perforation seems to be associated with manipulation of the stiff polyvinyl chloride tube after it has been in place for some time.

Although reflux is rare with a properly placed transpyloric tube, when reflux does occur there is a great risk of vomiting and aspiration. Usually reflux occurs if the tube has slipped back into the proximal duodenum or stomach. Feedings should be stopped until the cause of the reflux can be determined. An X-ray of the abdomen will reveal the tube's position and any intra-abdominal pathology. If the tubing is out of place, it should be removed and a new tube passed.

Transpyloric feeding has been suggested as a cause of necrotizing enterocolitis (*5,12,16*). In our series of patients, two (8.3%) of 24 infants developed necrotizing enterocolitis; both patients were 26 to 28 weeks in gestation and weighed less than 1000 gm. The 8.3% incidence is not excessive when compared to the incidence of necrotizing enterocolitis reported in the literature for other high-risk populations (*17*).

A complication which has not previously been reported occurred in one of our patients. A full-term infant with severe meconium aspiration syndrome was fed 20 kcal/oz formula at a rate of 150 kcal per kg per day via a transpyloric tube, and developed signs of upper intestinal obstruction on the fifth day of feeding. At this time the transpyloric tube was in the correct position as shown on an X-ray and was functioning properly. No formula was seen in the vomitus, and stools were being passed normally. When the transpyloric tube was removed on the sixth day, we saw that a large vegetative formula clot surrounded the tubing just above the feeding hole. The signs of upper intestinal obstruction disappeared rapidly, and the infant recovered uneventfully. The problem has not recurred in 30 subsequent intubations we have performed.

SUMMARY

Transpyloric feeding offers several advantages over gavage feeding and reduces the need for hypercaloric formulas and intravenous feeding methods. However, contrary to several reports, the technique is not simple and has a number of problems.

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DON'T MISS

The Consequences of Captivity

Captivity has been a part of armed conflict from the beginning of recorded history. Yet it was only within the last three decades, in 1949, that a major turning point in the treatment of captives was reached with ratification of the rules of the Geneva Convention.

In a Navy-sponsored study, "Universal Consequences of Captivity: Stress Reactions Among Divergent Populations of Prisoners of War and Their Families," Dr. Julius Segal, Dr. Edna J. Hunter, and Zelda Segal provide an overview of recent literature documenting the effects of this profoundly stressful experience. The authors point out that the effects of captivity are relatively constant across nations and cultures: as a rule, the physical, psychological, and social costs of incarceration are predictable, no matter what nations are involved as captor and captive.

Repatriated POWs of all nations appear to have difficulty reintegrating themselves into their families and society. Many returned prisoners are somewhat detached, lacking spontaneity and incapable of maintaining a sustained interest in anything. This apathy places an additional strain on a family already reeling under the stresses of reestablishing marital and parental relationships. Often overlooked are the problems the wife and children experience in reopening their lives to a long-absent husband and father they have learned to live without.

It is clear from published research—particularly from data presented in 1961 at the International Conference on Later Effects of Imprisonment and Deportation—that survivors of the POW experience, regardless of their national origin or the country in which they were held captive, are at risk for a staggering range of physical disabilities and symptoms. One example: long-lasting detrimental effects of malnutrition and starvation, found among British and Canadian troops captured by the Japanese as well as among repatriated Japanese POWs who scavenged for food while hiding after Japanese forces lost the Philippine Islands.

The authors show evidence that, in spite of attendant privations and persecutions, captivity has led many individuals to develop a finer sense of self-worth and a keener appreciation of life's values. Countless men and women, subjected to the malignant and cataclysmic experience of captivity, have been able to turn that experience into an instrument for growth and emotional maturation.

This study was published in the *International Social Science Journal* 28(3):593-609, 1976. Reprints are available from the Naval Health Research Center, San Diego, Calif. 92152. Ask for Report 75-84.

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